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"I cannot help plead to my countrymen, at every opportunity, to cherish all that is manly and noble in the military profession, because Peace is enervating and no man is wise enough to foretell when soldiers may be in demand again."—SHERMAN.

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THE TERRAIN IN ITS RELATIONS TO MILITARY OPERATIONS.*

BY CAPT. J. S. PETTIT, FIRST U S. INFANTRY.

"C'est presque toujours dan ses rapports avec le terrain qu'une disposition tactique est bonne ou mauvaise."—ROQUANCOURT.

IN approaching the study of the value of the terrain in modern operations of war, we are at once confronted by diversities of opinion among the leading military authorities of Europe to whom we must look for intelligent theories. These diversities are not mere differences which might be reconciled by slight concessions from either side. In the two greatest military nations of the world they have spread to opposite poles.

"The Germans affect a profound disdain for terrain and losses, and sacrifice everything to 'la vitesse.'" Von der Goltz says: "The terrain plays only an insignificant part in military operations, as its peculiarities almost always affect both parties equally." This is generally true, if by "military operations" he means to include only those preliminary to the conflict, but I conclude that such is not the limitation of his meaning, for he says later: "The effect of the terrain upon the battle has diminished in these days, because the ultimate success is no longer dependent upon the maintenance of a *definite order of battle*. Its effect is least in respect of the chief arm; wherever a man can go

* This essay received first honorable mention in the competition for the year 1891.

thither an infantryman can carry his rifle; even mountains do not any longer prevent him from fighting; in many cases the country will be of like influence on both sides."

It is possibly true that nature may on occasions be equally kind to both sides, but it is not probable that both sides will utilize equally the advantages she offers them, and other things being equal success will in all probability come to the general who uses the terrain most skillfully. The practice of the Germans is scarcely in accord with their theory, if Von der Goltz can be taken as an exponent of the latter, for they labor constantly in giving their officers and men practical instruction in the use of ground throughout the year near the various barracks, and on a large scale at the Autumn manœuvres.

It was they who taught the French "the growing and vast importance of the terrain in military operations under the greatly increased power of arms." We find French military literature rich in treatises on the terrain, while the German is, of course, comparatively free from them.

To my mind the French view is the proper one, and is amply sustained by the experiences of every modern conflict.

It may not be amiss to look into the development of the use of the terrain from the days when the plains were the classical battle-fields of Greece and Rome up to the present. The plain was the only battle-field for the phalanx and the legion, and it lent itself equally to the footman, the horseman and the charioteer in their hand-to-hand conflicts.

The first important lesson in the use of the terrain was taught by Leonidas and his little band of Spartans The Romans understood the value of roads, of defensive positions, and how to organize them, but their formation still compelled them to resort to the plains for combat.

The great middle ages give us but few useful lessons in warfare, save in courage, perseverance and heroism; with the invention of gunpowder progress in warfare began. Modern tactics may be said to date from the great King Frederic II. He augmented the fire of infantry, adopted linear formations, and maintained an iron discipline which has served for a model ever since his day.

The importance of the terrain as we understand it was unknown to him. He "rigorously forbade the occupation of localities, and, above all, villages."

But tactics and methods of war were soon to be changed by a

greater master than Frederic, and we have the combination of the dispersed and deep orders of battle with concentration on the decisive points, as established by the great Napoleon.

The importance of the terrain had already been noted by the master of military theories and the art of war—Clausewitz—who wrote about the beginning of this century: "Irrespective quite of their influence as regards the means of subsistence of an army, country and ground bear another most intimate and never failing relation to the business of war, which is, their decisive influence on the battle, both on what concerns its course as well as upon the preparation for it and the use to be made of it."

This relation Clausewitz had in mind has grown in importance steadily with the increased power of arms. It would be difficult to trace the changes in the valuation of the terrain through the various epochs in the development of the light and heavy ordnance up to the present, nor is it necessary. All are agreed that the point of view has radically changed, and its value must now be determined:

1st. From its effect on the condition of fire.
2d. The advantages of cover.
3d. Its effect on combination of arms.

Its effect on strategy is very remote and need not be discussed. It would be folly to avoid a theatre of operations strategically good because it offered difficulties in ground. The importance of the terrain must then be found on the field of battle. Meckel says: "The two conditions most essential to success in combat,—the two pillars of every combat of infantry,—are skillful utilization of the ground and fire discipline."

The employment of the terrain has two points of view: 1st. Augmentation of the effects of fire. 2d. As to cover; and these two points are to be kept in view in the statements which follow.

Let us glance rapidly over the progress of events in modern warfare, following the declaration of war.

First comes the mobilization, then concentration in the theatre of operations, not by long tedious marches as of old, but on great railroad lines, each striving to arrive first near the scene of action. The concentration effected, the forward movement is begun, the objective point being the enemy's army. Each side hopes to assume the offensive, and to gain the great moral advantage of victory in the first engagement. The cavalry screens are pushed well to the front to reconnoitre, cover the army, and bring

early news of the enemy. Up to this time the terrain has little or no influence on the course of events. Scharnhorst's doctrine must undoubtedly be applied, viz.: "We must scatter to subsist, and concentrate to fight," but in the large areas occupied by modern armies in their operations the terrain will offer about the same conditions to each. Word is soon brought that the enemy's patrols have been seen in front; an hour later the cavalry and artillery of the advance guard are engaged with the enemy's advance guard, and the infantry is hurrying forward to take its part in the uncertain combat. The leading brigade is pushed rapidly to the front. "An issue now takes place at a spot where it is not wanted, and at an hour when it is not expected." No time has been given for study of maps or more than a hasty inspection of ground. The troops are arriving rapidly, and must be quickly and advantageously placed. The commanding general's knowledge of the terrain is now of vital importance, for the fate of the day may possibly depend upon his judgment and celerity in selecting the strong points and designating the troops to occupy them. Perhaps he has failed to occupy a height which dominates his line, or a strip of woods, or he has left his flank where it can be turned or his line enfiladed. It is too late now, the enemy is already advancing to occupy the height overlooked, and he is too near to be intercepted. The position must be given up and another sought. His antagonist was quicker than he in estimating the value of the ground and has gained a point.

The Commander-in-Chief arrives, quickly surveys the line, changes its direction a little at some points, retires to a commanding position, sends instructions to the general officers as to his plan of battle and where he will be found. The engagement is soon on all along the line, and is made up of combats between small units in the different localities. We have suffered defeat at some points, but have gained temporary advantages at others. The first result is largely in the hands of the chiefs of regiments and battalions, for to them the terrain is of most vital importance. "The chief of the skirmish line must have the enemy and the terrain constantly in view."—(Meckel.) The company commanders who are in the thick of the fight, and must take advantage of every accident of the ground for cover, and to keep in view the conditions of fire without losing cohesion, have need of great theoretical and practical knowledge of the uses of ground.

To Genius is given that mighty power which enables it at a

glance to select the key of the situation, and rapidly and accurately to designate the places to be occupied by the various arms; or to detect the weakest point in the enemy's line, and at once to form a plan of battle.

Even genius must be assisted by professional training, and the man who aspires to be a thorough soldier to-day, cannot neglect practical and theoretical study of the value of the terrain in military operations.

The subject may be divided in various ways. We may keep in view solely the topography, and may take Clausewitz's division into three kinds, as distinguished from perfectly open plains, viz.:

1st. Hills and valleys.

2d. Hills and valleys modified by the presence of marshes, lakes, rivers and woods.

3d. The changes made by man, such as the introduction of villages, railroads, canals, etc.

Captain Heusch, in his "Tactique d'aujourd'hui," also approaches his subject from three points of view, viz.:

1st. As to general forms.

2d. As to obstacles, cover and nature of soil.

3d. As to communications.

The first of these subdivisions includes Clausewitz's and brings us to a detailed discussion of topographical forms, including level plains.

The following seems to be the generally accepted valuations in the scale of possibilities for the various arms from the point of view of *mobility*.

INFANTRY is the arm which can most readily overcome irregularities of the ground. It can manœuvre in close order on slopes up to 10°, but not for long distances when it is near 10°; upon steeper slopes than this, movements in close order are difficult and fatiguing. Skirmishers may advance readily over slopes of 20°, but beyond this inclination they are practicable only for isolated men. At 30° the ascent becomes difficult even for unincumbered individuals, while greater inclinations can only be overcome by taking advantage of irregularities of surface, and by holding on to rocks, trees, etc., which would make progress impossible in the face of an active enemy.

CAVALRY can charge in line over ground of which the inclination does not exceed 6 or 7 degrees. Above 8° the charge in line must be renounced, but the charge as foragers may be made

over slopes of 20°, especially if lines of steepest slope are avoided.

As for ARTILLERY, it cannot move for long distances over ground inclined at more than from 12 to 14 degrees, and even then it must be solid and smooth. Mountain artillery is, of course, excepted. In any discussion of the terrain alone, it is assumed that the other conditions, viz.: discipline, courage and morale, are equal.

GENERAL FORMS.

Plains.—In this we must include all ground that has an average slope of less than 5°. A perfectly flat plain, devoid of influence on military operations, does not exist save for small bodies of troops. Flat terrains are generally alluvial and fertile, and being well adapted to the use of man, they are generally cultivated and contain villages, farms with fences and hedgerows, ditches, roads, etc. In addition, streams of various dimensions are found winding through them. If the defense has constructed intrenchments, strengthened his flanks, opened good communications in the interior and to the rear, and has cleared his front and flanks of all hedges, walls, etc., which would offer shelter to the enemy, the advantages will be on his side. The obstructions interfere with the movements of the assailant's artillery and cavalry; the country offers no dominating points necessary for an effective use of the former, and the walls, ditches and hedges mask its fire; while the cavalry, compelled to move along the roads, is of little value as a screen, and is unable thoroughly to reconnoitre the enemy's position. It is true that these obstacles affect the defense disadvantageously, for they limit his fire to short distances, and afford the assailant opportunities for surprises which are trying to the morale of his troops.

Such terrains are usually avoided in large battles, but are often used in minor operations and partisan warfare. We have a generous supply of such terrain west of the Mississippi, but the chances for its being the scene of great battles seem to be very remote.

Undulating ground, hills and valleys.—Under this heading we may include all ground having slopes of over 5° inclination, and all heights under 1000 feet. It forms the greater portion of every field of battle. It is on this ground that military training and knowledge of terrain find their widest application. The proper use of shelter, the selection of strong points, the disposition and

combination of the various arms to obtain full advantage of their peculiar functions and give the best conditions of fire, call for keen application of the acknowledged principles governing the use of terrain. In this terrain will be found dominating heights and ridges, lower hills, valleys, slopes of various declivities, ravines, and possibly villages, farms, streams and roads, all of various degrees of importance to the attack and the defense.

It may be covered or open, or partially covered. Thoroughly covered ground is not advantageous to the operations of war, especially with large armies. It is often used in small operations, and an energetic commander may in such terrains baffle a much superior force. Using it as a screen he may surprise and annoy the enemy's flanks, cut off his trains and otherwise harass him. The communications are generally poor, and are unknown to the assailant, who will hesitate to advance into unreconnoitred territory.

Open ground is generally favorable to the defender, especially when he has had time to select his position and prepare it for defense. It scarcely happens, however, that the field of battle lies in perfectly open ground. It would be rare, indeed, in our country.

Hilly ground partially covered, or "terrain accidenté," such as is found on the fields of Gettysburg, Antietam, Königgratz, Gravelotte, Woerth, Vionville, etc., is the most usual type. The heights form the most important features in this terrain. The military crest, which is generally a little in advance of the topographical one, so as to bring the entire slope into direct and flank fire, offers great advantages to the defense. It gives a good field of view if the ground be open in front, and from its commanding position the defender's artillery may force the deployment of the attacking columns at great distance, and compel the enemy partially to expose his plan of battle. The defense may also be able to compel the assailant to advance under a galling artillery fire, without being able to do much injury in return, as the slope lessens the dangerous zone for the defender, and his reserves, ammunition columns, etc., are safely sheltered behind the ridge. Even after reaching the bottom of the slope, the advance becomes labored and difficult. Such a position, occupied by men not broken in morale and armed with magazine guns, with plenty of ammunition, might possibly be taken by assault by vastly superior numbers, but it would be at such an enormous expense

of blood that it could only be justified after other experiments had failed. The enormous losses in the Guard Corps on the glacis-like slopes before St. Privât, show the death-dealing power of even so poor a weapon as the Chassepot of that date, on troops advancing up a slight inclination which offered the defense a free field of fire. Six thousand men were said to have been lost in ten minutes. It was expensive, but it taught the Germans "The folly of attacking such a position with infantry before it was fully prepared by artillery."

The magazine rifle undoubtedly increases the value of such terrain to the defense. A crest is doubly strong when it is bounded in rear by an undulating plateau on which a second position can be chosen and fortified and manned by the supports; for it is very discouraging to troops to discover that they have by a great effort taken one line, only to find another in rear equally strong. If good roads are found in rear of the crest, parallel to the line, by which different points can be quickly reinforced, and if in addition it has good lines of retreat near the centre, it will be unusually strong. If the valley in front of the crest contains a stream, or villages, or both, as at Pont Noyelles, strong advanced positions may be taken, in fact ought to be taken if the size of the command will permit. The French position at Pont Noyelles was an almost ideal defensive one. The slopes ran gently up to the crests, which were in several places crowned by woods from the edges of which clear fields of fire were obtained; the spurs ran out to the front like salients in a bastion. The Hallue, a stream fifteen to twenty yards wide and from three to eight feet deep, followed a winding course through the valley. Scattered along this stream were five villages covering the roads, the whole forming an unusually strong first line, with a stronger second line within easy reach. The terrain offered the defense every advantage; it did not save them from defeat. It had one serious defect in its relation to the size of the French army; it was too long for the number of troops, and the French general attempted to hold its entire length, thereby neutralizing its advantages.

A position is rarely found of proper length which at the same time is strong on the flanks. If good conditions are found for one flank we must be satisfied and must strengthen the other by field works, and by the disposition of troops; vigilant cavalry patrols should be sent out to watch the field of battle and give timely

warning of any attempt at a turning movement. Inaccessible positions on the flank are only valuable in a strictly passive defensive which cannot lead to decisive results. Every defensive position should be selected with the view of its lending itself to the offensive at the first favorable opportunity—consequently ponds, marshes and streams are objectionable in front of a defensive position, if they would seriously impede a forward movement.

The terrain frequently offers advanced positions which may be of value to the defense in the early stages of the conflict. Their occupation by small bodies of troops is of doubtful expediency, but when so occupied the troops should be withdrawn before their safety is compromised, for if they are thrown back on the main line in confusion they mask its fire and may demoralize it. The terrain may possibly offer a safe line of retreat, as at St. Marie-aux-Chênes, where fifteen hundred French forced the untimely deployment of twenty thousand Germans, and retired safely along a ravine which runs east and west, to the north of the village. Advanced posts of this nature are very important to the defense.

We may conclude, so far as *General Forms* are concerned, that the best field contains a dominating crest, with a long regular slope to the front, of slight inclination, free from objects that might mask the fire, and of sufficient slope to make the advance of the enemy difficult and labored. Such slopes can be well beaten both by artillery and infantry fire. If the crest has salients and re-entrants, as in a fortification, so much the better, provided the salients are not too acute and the line of the crest too tortuous. General forms are composed of a very great number of detailed ones, and must fill many conditions in order to make an ideal battle ground. It would be impossible for any officer fully to comprehend all the details of a position of considerable extent in the time he would have for examination and study of it. He should be able to interpret quickly its chief characteristics, which he might do by asking of himself and answering three questions, viz.:

Is it strong? Has it good interior and exterior communications? How will the security of the army be affected by it in case of defeat?

Practice ought soon to fit an officer to examine any usual form of terrain rapidly and intelligently, and to determine the answers to the above questions. At first it seems full of details, all of which

have military significance. The amateur painter becomes discouraged in the attempt to reproduce details, which the skilled artist merges in general forms. The amateur soldier must pass through the same stage in acquiring a correct "coup d'œil militaire."

Ravines.—Ravines have quite an appreciable influence on military operations. If they are perpendicular to the line of defense or approximately so, and are deep and long, they force the assailant to divide his line, and offer serious obstacles to the movements of his artillery and cavalry. If they are parallel to the line and contain water, they have values similar to wet ditches in permanent works. A ravine in rear, while it might not influence the combat, might seriously affect the retreat of the army.

Water courses.—Small water courses present some advantages to the defense. They delay the progress of the assailant, destroy his cohesion, and enable the defense to gain time; this is true even when the streams are fordable. With increasing breadth and depth the difficulty of passage increases, but Von der Goltz says: "The greatest river in Europe has been crossed and recrossed in the face of the enemy at least twenty times in the various Russo-Turkish wars."

A river behind the line is a very serious menace to the safety of an army. Lee fought the battle of Antietam with his back to the Potomac, and a more active antagonist with greatly superior numbers would have destroyed or captured the greater portion of his army and all of his supplies.

Mountains.—Mountainous country is unfavorable to military operations. The communications are bad and are rarely sufficient for more than small bodies of troops. Cavalry and artillery are of little use. The population is small and the resources of the country limited. In the passive-defensive, mountain paths and roads may be held against greatly superior numbers, especially when the approaches are difficult, but mountain passes can generally be turned. Mountainous country is advantageous to the defense in minor warfare, as it offers concealment for small bodies of troops which can annoy an enemy in many ways, and possibly force him to detach a much larger body to protect his communications and trains.

In these minor operations knowledge of terrain is of capital importance.

Woods.—Woods are very important features of the terrain.

Large forests are not favorable to military operations, while small woods on the crests, with salient and re-entrant edges, giving direct and flank fire and a clear view of the ground in front up to 1000 yards, add much to the strength of a position. The edge is the important part to be held, and if it is lost the occupation of the wood is impossible. Should there be a clearing, or a road in rear of the outer edge, this may be held by the supports, and may prevent the further advance of the assailant, and inflict serious losses on him as he attempts to debouch. If the assailant is strong in artillery, the troops should be placed a little in advance of the edge, and their position strengthened by field works, obstacles, etc. An attack on a wood is generally a very murderous undertaking. Modern battles furnish many examples of the great influence of woods on the course of battle. It will suffice to mention the east and west woods at Antietam, the Vaux and Gervaux at Vionville, the Swiep, Wald and Hola at Sadowa.

The edge being lost, it is not advisable to continue the combat in the interior, as it would degenerate into individual struggles, and the attacker, having by previous success gained the advantage in morale, will readily force his opponent to retire. The troops on both sides lose cohesion, but the defense being familiar with the roads, should gain the prepared rallying places rapidly and prepare for a second effort. Meckel says: "A wood is a filter in which the entire attacking brigades are engulfed only to come out on the other side in little isolated groups, which will lose their blood uselessly."

A wood may be situated so as to give shelter to the reserves and furnish a screen for the cavalry from behind which it can issue and harass the enemy's flanks or charge his broken infantry.

Before occupying a wood it should be thoroughly examined. Any small clumps of trees or bushes in front of the edge which might furnish shelter for the enemy or mask the fire of the defender, should be cleared away if there is time, and the edge placed in strong defensive condition.

An attack of a wood is only justifiable in great emergency. The interior is known to the defense—to the assailant it contains unknown pitfalls, ambuscades, concealed roads and positions, and only troops of unusual courage and steadiness can be made to move to the attack over open ground.

Important woods would be found in our country on every large battle-field in the northern, middle and southern States.

Localities.—This, in military parlance, includes woods, villages, isolated buildings, farm houses, granaries, etc., situated on the field of battle, around which the combat is certain to become localized. They give protection to the defenders, are easily strengthened, and the battle becomes a struggle for the possession of these strong points. They furnish shelter, and points of support during the combat, and may screen the march before or after the issue of the fight.

Villages.—In our country, villages have not the importance given to them in continental Europe, and this is due to differences in construction. Our buildings are generally of wood or brick, and the villages are not compactly built. There is also an absence of the stone walls, which are so frequently found about gardens and grounds in European towns, which add greatly to their strength. If the assailant were strong in artillery, our villages would soon be set on fire, and the flying splinters and falling walls would be very demoralizing to troops located in the village. From a military standpoint a village resembles a wood in that the edge is the important line. If the first line be lost, the troops should have a second line in rear, held by the supports, to which they could retire and begin a new defense. Interior fighting is of doubtful utility. Frederic avoided the occupation and attack of villages because "It costs too many of the very bravest men." The importance of a village depends upon its location, both in respect to the line of battle and the theatre of operations. If it is simply an advance post, it should be held by sufficient troops to force the early deployment of the enemy's columns, and to delay and observe his movements. These objects completed, the defenders should leave their retreat so as not to be cut off from the main body. If it forms part of the main line of defense it must be held to the last extremity, and works should be prepared in rear from which a heavy fire can be poured into the enemy as he attempts to debouch. An attack on a village well prepared for defense is a hazardous undertaking, and the way should be thoroughly prepared by artillery fire before an attack is ordered. The Germans had this lesson brought home to them very seriously at St. Privât (*vide* German official reports). The method of preparing a village for defense does not properly belong to our subject. Le Bourget—St. Privât—Froschwiller and Bazeilles, furnish ample material for the study of the attack and defense of villages under modern conditions.

Isolated Buildings, Farms, etc.—There are few isolated buildings or farms in our country that would have any value on the field of battle. They would simply furnish excellent targets for the admirable field artillery of to-day. If a building is found on the line it might add strength to resist an attack by infantry alone. Farms, with strong stone buildings and walls, (like St. Hubert) are extremely rare in our country. Throughout New York and the New England States many low, thick stone fences exist, which would give excellent protection to infantry, and would seriously interfere with the movements of artillery and cavalry. There are many natural and artificial irregularities of ground, such as stone quarries, railroad embankments, cuts, ditches, dry stream beds, not unimportant in a military sense. The sunken roads at Waterloo and Antietam furnished two bloody chapters in the world's history. Little Round Top at Gettysburg, and the stone quarries at Gravelotte, could tell thrilling tales of the heroic efforts of brave men to hold bits of ground.

Obstacles.—Ponds, ravines, marshes, and water courses are obstacles to the movements of troops, and are of considerable value to the defense while acting solely on the defensive; they become serious obstacles, however, to the counter offensive which must be assumed at any favorable opportunity; if in rear of the position, they may cause the destruction of the army. A position may be strengthened by artificial obstacles such as abattis, and wire entanglements. Owing to the increased rapidity of fire of modern rifles, obstacles have grown greatly in importance; for an attempt to remove them under fire would be fatal indeed, while the delay caused by the effort to pass through or over them would be very critical. They could only be prepared for a premeditated battle, before which the troops would have ample time to strengthen their positions, and in this case all obstacles that would give shelter to the enemy should be removed so as to give a clear field of fire for at least 800 yards, or as far as possible in the time allowed. There are many other obstacles known to military men, such as chevaux-de-frise, palisades, trous de loup, fougasses, crows' feet, military pits, and fraises. They have fallen into general disuse, as they require too much time and material in their construction. "Those obstacles are most economical which require little special material, and are improvised from natural sources."—(Brackenbury.) Abattis are the obstacles most frequently used, because the material is found on the

ground. Wire entanglements are the very best obstacles, and are easily constructed when the wire can be had. They offer no protection to the enemy, and the wire remains an obstacle after the entanglement is destroyed. Obstacles must be placed so as to be under the fire of the defender. They have one disadvantage, they interfere with the counter offensive.

Communications.—In all military operations the communications are of the highest importance. Their value will depend upon their condition and direction. The course of the battle necessitates constant changes in the line. The reserves must be brought up at the critical moment, perhaps they have already been thrown into the line, and one part is to be reinforced at the expense of the other. Good roads in rear of the line, and approximately parallel to it, are then of great value; and if, in addition to these, others lead to the rear nearly perpendicular to the line, they may hasten the arrival of reinforcements and ammunition, facilitate the removal of the wounded, and may finally prevent defeat from being turned into a rout.

Nature of the Soil.—The nature of the soil must be considered in military operations. In the siege of fortified places it becomes of great importance, for it may determine the side upon which the attack must be made. Rocky soil makes mining difficult if not impossible, and may also interfere with the construction of proper approaches. A firm soil favors the attacker in an engagement, so far as the movements of his cavalry and artillery are concerned. If it is hard and resisting, it will be favorable for ricochet firing; therefore, troops subjected to a heavy artillery fire should be placed behind soft ground from which the shells will not rebound. Artillery should also be placed behind soft ground if it will not seriously interfere with its advance later. The nature of the soil is also important in the selection of camps, bivouacs and cantonments, especially in wet seasons. Sandy soil dries quickly, does not interfere with the movements of the troops of any arm, and does not facilitate ricochet firing. It is therefore the best soil for military purposes. Rocky ground makes the movements of all troops difficult and fatiguing.

Cover.—The great necessity for cover for troops while passing from the order of march to the order of battle, and in advancing to the attack, is well recognized by military men. It is so important that, in European armies, "The training of the individual in taking advantage of ground begins at the very commencement

of his service."—(Boguslawski.) A terrain which offers no cover to the assailant will rarely, if ever, be found. Clumps of trees, vines, hedges, fences, and undulations of ground, are found in all countries and on all battle-fields. They are advantageous to the assailant, as they cover his advance, enable him to conceal his movements, protect his reserves and supports from the defender's fire, and give opportunities for surprises, which, utilized by a skillful commander, lead to success.

Covered ground is generally poor in interior communications, and the irregularities interfere with the cohesion of the advancing line. The proper use of cover is difficult to enforce on the field of battle. There are many skulkers in every combat, and many men find it much harder to leave the friendly shelter of a tree, bush, rock, or bit of earth, after they have felt its protection, than to continue to advance when in the open.

General Sheridan's attention was attracted by the great number of skulkers at Gravelotte. Having found shelter in a ditch or behind a hillock, they became so attached to it that they could not leave it at the command to advance.

When we recall the failure of the first attack on St. Privât, and the 25.4 per cent. loss in the first division of the Guard Corps in advancing over open ground to the attack of a place not sufficiently prepared by artillery fire, we are forced to admit that the advance of troops over uncovered ground against an unshaken line must be avoided if possible. In covered ground we must trust to a severe discipline, and the efforts of the officers and non-commissioned officers to force the men to leave cover at the proper time. After the 800 yard limit is passed by the advancing line, cover should only be used to shelter the men while they regain breath. The fire from behind little ridges is not very accurate. The view of the enemy's line is, perhaps, not very good, and in trying to keep the head protected the men aim high. In our country plenty of cover will be found on every field. In this connection we may repeat the words of our late distinguished chief, General Sherman, on accidental forms and cover. "We were ordinarily established in a wooded country, and although our lines were deployed in accordance with tactics, the men fought nearly always in groups of skirmishers, utilizing to the best advantage the forms of the terrain and the natural shelter. We most frequently took the offensive, but in a country cut up and wooded the defensive had a marked advantage. The defenders,

in fact, were always ready and covered, and knew the terrain in advance of their front, while we were obliged to advance slowly over unknown ground, often covered in the open parts by artificial obstacles, which detained us under the murderous fire of the enemy."

Brackenbury says: "Visitors to the German autumn manœuvres are greatly struck by the fact that on arriving in the neighborhood of a large force prepared for battle, they hardly see anything of it, though the ground appears to be perfectly level. It is astonishing how many depressions occur even on large plains, and if to these be added such features as hedgerows, walls, strips of plantation, and so on, a large army may be easily hidden from view."

Every modern military writer dwells on the great necessity for thorough *practical* instruction of officers and men in taking advantage of the irregularities of the ground for cover. It is a very essential part of the peace training of every live army. It has certainly become evident that on the field of battle the terrain has a dominating influence and must be kept constantly in view from the first contact of the advanced guards until the smoke and sounds of battle have died away.

COMBINATIONS.

Every army must be composed of infantry, cavalry and artillery, each arm having its particular function in the conflict. Infantry is the essential arm. It is adapted to all kinds of ground; it must march to the final assault; it must make the last stand. The artillery prepares the way, can assist in the pursuit, or aid in covering the retreat. The cavalry is the intelligence corps, the "eyes of the army." On the field it must still furnish knowledge, help to protect the flanks, bring warning of any attempted turning movements, and await opportunities to charge the enemy's disordered ranks, foil his cavalry, make vigorous pursuit of the defeated, or assist in covering the retreat.

No command is complete without all three of these, and the loss of one is quickly felt.

Infantry and artillery may fight successfully, but without cavalry they may be surprised, will lack knowledge of the enemy, and if successful cannot thoroughly reap the fruits of victory by pursuit.

Cavalry and artillery in combination often do good work on

favorable terrain, especially in advanced positions, but they would be able to do little against a strong infantry position. If the cavalry is trained to fight on foot, the value of this combination is much increased, as was clearly shown in the War of the Rebellion.

The weakest of all tactical combinations is that of infantry and cavalry.

It is evident that we should choose that terrain which will enable us to get the greatest benefit possible from the peculiar powers of each arm. We must have dominating positions for artillery, gentle slopes on the flanks free from obstacles which would interfere with our cavalry, and sufficient cover along the front to aid the advance of our infantry; and the commander must know how to locate his troops so that each may have the terrain most suitable to it. "If the terrain is powerless to change the normal formation and the general process of execution, it is not true from the point of view of *combinations*. Here it plays a capital rôle, and we can affirm that the success of the battle depends greatly on the utilization of the terrain in this connection" (Colonel Robert). It would be folly, for instance, to place the artillery on the lowest ground, or the cavalry in the rocks and bush.

TACTICAL FORMATIONS.

The influence of terrain on tactical formations is steadily increasing, due to the increased power of fire-arms. Compact formations and rigid lines can now have no place in the line of battle. It is necessary to fight in open order, and at the same time to take every possible advantage of ground, without permitting open order to become loose order, or the troops to lose cohesion. The different forms of the terrain must then be kept carefully in view in devising systems of tactics and drill. "The terrain, however, never alters the normal formation; it does affect questions of distance and interval, modifying somewhat the breadth and depth of the different units. Like a convex or a concave mirror, it reflects to us simply the image of the normal formation, with its dimensions relatively increased or diminished" (*Revue Militaire de L'Etranger*, 1883). At points naturally strong the line may be thin, while the weak parts must be strengthened by increased depth. Tactical formations must be sufficiently elastic to permit their free application to any kind of ground upon which the par-

ticular arm they are prescribed for may be called upon to manœuvre.

In flat, open country the order of march must be changed into the order of battle at long distances from the opponent: a tactical disadvantage, as small columns are more compact and more easily kept in hand than long, thin lines; furthermore we desire to conceal our movements and intentions from the enemy as long as possible and to delay forming line of battle before we reach the 800 yard limit, from which the advance on the defender's position is to be ordered. The terrain will decide where this change must take place, hence its influence on the battle begins before a shot is fired.

The strategical choice of a position is first in importance, then its tactical value must be carefully determined, and the sites chosen which will give the greatest possible advantages to our side and leave the enemy those tactically defective.

"In fact one of the objects of tactics is to teach us to appreciate the strength we can draw from a limited portion of ground; to correct its defects by local modifications, to dispose our troops on it advantageously, to profit by its forms and obstacles, and to strengthen ourselves by skillful use of that portion we have chosen for cover and support."

In brief, tactical formations must have mobility on all kinds of ground, without loss of cohesion. They must also permit us to obtain the maximum fire effect under the same conditions. They must allow free use of cover and the irregularities of ground, without impairing the strength of the line.

RÉSUMÉ.

In premeditated battles, the defense generally has time to make a careful selection of its position. If judiciously occupied and chosen, the terrain ought to offer many advantages to it. The following requirements should be borne in mind:

1st. It should offer a commanding position not dominated by any other within the range of artillery.

2d. It should have a clear field of fire for infantry in front and on the flanks to at least 800 yards.

3d. It should favor the fire of artillery to at least 3000 yards.

4th. It should have a good secondary line and offer shelter for the reserves in rear of the first line.

5th. It should have good lines of retreat near the centre.

6th. The terrain in front should present no obstacles to a vigorous offensive return.

7th. It should have good interior and exterior communications.

8th. It should not be too extensive for the size of the army which is to occupy it.

9th. It should permit the defender to make advantageous use of the three arms.

10th. It should offer good support for the flanks.

I doubt if it would be possible to select a terrain which would meet all of these requirements, but in making a choice the commanding officer must have them in mind. In battles of rencontre, of which Rézonville is the best modern type, the time for reconnoitring the field and posting the troops is very limited and knowledge of the enemy's number and position is vague. A vigorous commander hopes to assume the offensive, but circumstances may soon force him to be on the defensive. It is a very perplexing situation, and he who grasps the main points of his position and properly occupies them is either a great or a fortunate commander.

In nearly every great modern battle mistakes have been made in the occupation of the terrain which have had great influence on the course of battle, and possibly on the result. The Austrian left at Sadowa, the French right at Froeschwiller and at Gravelotte, are some examples of poor judgment in the occupation of terrain.

The advantages in terrain are not always confined to the defense. The attacker desires to conceal his movements from his adversary as long as possible; he wishes to arrive at close range quickly, with his troops well in hand and little shaken by the enemy's fire. A "terrain accidenté," covered with bushes, hedges, and with depressions and irregularities in the ground in which the supports and reserves can be concealed and sheltered, will aid him greatly in disguising his intentions as to the real point of attack, and will furnish cover behind which his lines can draw breath for the next rush. Such terrain is generally poor in interior communications, and if greatly cut up it makes the advance difficult and fatiguing. Obstacles are met at some portions of the line, such as hedges or streams, which break its cohesion for the time, and necessitate reforming on the opposite side, and a consequent delay of the movements of other parts.

The view is limited, and the movements of the artillery and cavalry are restricted. The Germans say: "The combat crystalizes in covered ground." They prefer to advance in comparatively open ground, and trust to "la vitesse" and discipline.

It may be well to bear in mind that the Germans have for twenty years been studying and drawing conclusions from a war in which they had remarkable success from the very beginning; they had also marked superiority in numbers, discipline and organization, and were rarely on the defensive. On the other hand, the French have been trying to console themselves for a humiliating defeat, and to perfect their organization and training so that in the next great conflict they may avenge the indignities they have been forced to endure. They admit that one great weakness in their late war was the lack of training of officers and men in the proper use of the terrain in selecting positions and utilizing cover, and a want of understanding of the proper adaptation of tactics to the terrain under modern conditions of fire. The French lay much stress on the terrain, and their military works abound in instructions for its use and in descriptions of its various forms and peculiarities. The Germans spend much time in individual training of officers and men in the utilization of the irregularities of the ground. One of the great benefits they derive from autumn manœuvres is their experience in the use of ground. It seems to me that the history of modern struggles favors the conclusions drawn from them by the French as to the "growing importance of the terrain with the increased power of arms."

THE TERRAIN AND FORTIFICATION.

Fortifications are built to add strength to a position or line of defense. The study of field fortifications is, then, complementary to the study of the terrain. The weak places must be strengthened most, and in laying the trace and establishing the profile of the work, the terrain must be constantly in mind. A crest is naturally strong, and is easily fortified; a weak flank, on the contrary, will require extensive strengthening, so that the engineer must first thoroughly appreciate the natural advantages and disadvantages of the line before he can justly estimate the quantity of artificial assistance it needs to correct its faults. The key-point must be recognized, and especially prepared for a vigorous defense. A thorough knowledge of terrain is a necessary part of the training of every military engineer.

THE PLAN OF BATTLE.

This is generally determined by strategical considerations, coupled with the relative strength of the armies, and would not be greatly influenced by the terrain. No plan of battle should be devised to extend beyond the first contact with the enemy, except in a premeditated battle in which the enemy's position, numbers, etc., are well known; and even then, only general information as to the desires and intentions of the commander should be given, as the most elaborately prepared plan of battle may have to be entirely changed an hour after the opening shot is fired. In future wars "battles of rencontre will be the rule, premeditated battles the exception." Both armies will be rapidly moving towards the scene of conflict, each striving to gain the most advantageous ground, and to reconnoitre it thoroughly. At first no definite plan of battle is formed, nor can it be formed until one side is thrown on the defensive and has assumed a line of defense. The other side is now prepared to profit by the errors in selection and occupation of the terrain made by the defensive, and to form for the time being, at least, a plan of battle.

If superior in numbers a combined front and flank attack will offer many chances for success. The terrain now increases very much in importance, and we must give especial attention to it in the vicinity of the enemy's flanks. If we can conceal our movements and surprise him on either flank we will gain a great advantage, but if the terrain is open and flat a surprise will be impossible and success doubtful. If the ground in front is wooded, or covered with brush, or has valleys leading to the rear of the enemy's position, or heights which dominate his flank, our chances of success are largely increased and the plan of battle will be determined by the terrain. Froeschwiller is a good illustration. The flanks of the French line were in the air. The valley of the Eberbach ran in rear of their right flank and opened on the German left, offering the latter an excellent opportunity for a turning movement which they were not slow to seize. They occupied the village of Forstheim which commanded the valley, and the French right was completely turned, which was the decisive act in the battle. The German general grasped the weakness of the French position topographically, and, taking advantage of it, gained a substantial victory with his superior numbers.

The magnificent reconnaissance work of the German cavalry

in connection with most excellent maps of French territory, gave the German officers early information as to the topography of the French positions, and their peace training taught them how to utilize this information on the battle-field. Knowledge of terrain is very essential in making a reconnaissance in time of war, when time and materials are limited and accurate information is extremely important. At the close of the last century the chief of the Austrian Imperial Staff suggested to Suwarrow that a careful reconnaissance be made. The old hero, with some temper, replied: "Reconnaissance! I am for none of them. They are of no use but to the coward, and to tell the enemy that you are coming. It is never difficult to find your enemy when you really wish it. Form column, charge bayonets, plunge into the centre of the enemy—these are my reconnaissances." As the old Marshal had never been defeated, his remark was taken as an indication of military genius. We—of to-day—can scarcely give it an interpretation complimentary to the great soldier. "We are no longer preoccupied by the angle which our chosen position makes with our line of operations or line of retreat; 'the best way to cover both is to win the battle,' and the skill of the chief consists in rapidly utilizing the best part of the ground he occupies."

The importance of a position depends upon strategical considerations; its strength comes from tactical considerations, which depend entirely on the terrain. Strategical considerations may compel us to occupy a position which is very weak tactically and the advantage in terrain will probably be with our opponent.

In every theatre of operations there are many military positions and it is not probable that any can be found free from defects. The difficulty lies in choosing a position with favorable terrain, which will at the same time be adapted to the circumstances in which the army is placed. It is an easy matter for one who is free from responsibility to criticise, after the battle and in the quiet of the study, the choice so made. It is quite a different thing to make the choice on the field, with but a few minutes for thought, and with the responsibility for the safety of the army resting on one.

EFFICACY OF FIRE.

We generally seek dominating positions from which artillery can obtain an extensive view of the field, and utilize its long range; but, in common with infantry fire, it is more effective when there is but little difference in level between the firing point and

the object. It is generally admitted that an angle of fall greater than 25 to 30 degrees is disadvantageous. For infantry we get the best combination of fire effects and security when the slope is from 10 to 15 degrees. On more violent slopes accuracy is lost and greater exposure is necessary in firing. Estimation of distances becomes very uncertain between places that have great differences of level, and the dangerous space is diminished.

The length of the slope is very important. Long gentle slopes, free from obstacles that might screen the enemy or afford him shelter, are very advantageous to the defense. Steep declivities are only useful in a strictly defensive position, and give poor conditions of fire. From a position on a height which is uncovered or open towards the enemy, the defense has great advantages in efficacy of fire. The artillery has extended views, and can pour a demoralizing fire into the enemy's columns when they debouch into open ground, and it can readily determine the range. The infantry has also great advantage in accuracy and rapidity of fire.

There is another value of terrain not by any means the least, which is its influence on the morale of the soldier. I have seen it stated that even a shallow ditch along the line stimulates the morale and increases the determination of the men behind it. It may be only a line on the ground, perhaps, but lying behind it side by side, the sympathy of a common duty and the mutual confidence developed by comradeship, make it a barrier not to be despised by the enemy.

We have endeavored to show that the terrain is of importance in calculating the three things which are vital to an army, viz.: its strength, security and mobility; and that on the battle-field, other things being equal, victory must come to the general who most skillfully uses it. It affects the combinations, the efficacy of fire, the plan of battle and the tactical formations and movements, and is only excluded from the domain of strategy. Opinions may and do differ as to its importance in these things separately, but collectively it is a recognized power which, firmly grasped, leads to victory. It has grown steadily with the evolution of the art of war, and I think we can safely say that tactics, both grand and minor, must for the future take the more complete utilization of the terrain, both as to general forms and accidents, as the principal text upon which they must be devised.

THE FUTURE.

Twenty years have passed since the Germans marched into Paris. These years have been so fruitful in military inventions and discoveries, and such enormous progress has been made in the development of destructive weapons as to throw us completely into the unsatisfactory domain of speculation as to the course of events in the battles of the future.

The Lebel rifle makes the Chassepot appear as an antiquated weapon, while smokeless powder marks an epoch in military history only second in importance to the first invention of powder. Machine guns of great power and accuracy have multiplied in numbers, and have reached great mechanical perfection.

The dangerous space, rapidity of fire, and range of all arms, have increased enormously, while the physical powers of man and horse have not changed. There will be no smoke to indicate the enemy's position or to obscure the aim, and the report of the rifle is said to be so diminished in intensity "that without the whistling of the ball it would have passed unnoticed." We may possibly determine the direction from which the shot is fired if we see the ricochet, but the range will still be unknown. The fire from behind cover will approach the efficacy reached on the target range. The German rifle, model of '88, has a trajectory so flat that when the sight is placed at 500 meters the projectile rises but four and a half feet at its highest point; at 1200 meters it will pass through two men; at 300 meters it will pass through four men, and from eight to twelve aimed shots can be fired per minute. Will it be possible for troops to advance in the open order in *any* formation, under such fire? Under these conditions the terrain becomes second in importance to fire alone. Tactical formations must be based on two things. "They must assure preponderance of fire and diminish vulnerability by permitting the use of all the caprices of terrain."

"With smokeless powder and the heavy and accurate fire of artillery, all of the accidents of the soil become of first importance, and upon the skill of the chief in utilizing them will depend the success of all detailed operations." (Nigote, in "The Grand Questions of the Day.")

"The greater the intensity of fire, the greater the distance at which its action is felt, the more important it becomes to get cover from the accidents of the soil, and consequently the more necessary to use the terrain intelligently." (General Lewal.)

These are the opinions of men of experience in war, who have made the study and practice of the rules of warfare their chosen profession and we must give them the importance to which they are justly entitled.

IMPORTANCE OF STUDY.

The great importance of practical and theoretical study of the terrain cannot be too strongly impressed on officers and men of every grade and every arm of the service. Great battles fought under the command of the general are the exception, but they are made up of local combats in which the company becomes the fighting unit.

Guichard says: "The terrain is truly an *arm* of which every soldier and non-commissioned officer, as well as officer, ought to know the use; and the daily exercises ought to tend to develop in all the faculty of quickly appreciating its resources and defects."

A French writer of note says: "An officer should have it in mind in his daily walks, and make constant application of it."

It can be said, to our shame, that with all of the grand opportunities placed before us, especially at frontier posts, with great stretches of country of infinite variety topographically, good climate and abundance of time, this very important work has been totally neglected. Year after year is devoted to parade-ground drills in the school of the company, and in battalion movements of scarcely probable utility on the battle-field, while we do not reach the primer in the education of our troops for war.

We find in Von Scherff that "skill in taking advantage of the ground is the *third* quality which we should seek to develop for decisive action by individual training," the first being discipline, and the second skill in the use of arms. To this testimony we may add that of every modern military writer of note.

We have for twenty-five years been carefully preparing to remain in perpetual peace, and our military training to-day stops at the very threshold of the soldier's profession. But war is inevitable, it is the lot of man. May we not now drop the shop-worn anecdotes of past glories and begin the preparation which will fit us for modern war. To this end we should at once begin the practical instruction of officers and men in the uses of the terrain. It is feasible, it would be interesting in every detail, it is an indispensable part of the training of every professional soldier worthy of the name.

THE ARTILLERY SERVICE IN THE WAR OF THE REBELLION, 1861-65.

By BVT. BRIG.-GEN. J. C. TIDBALL, U. S. Army.

(*Continued from* Journal, *No. 58.*)

VI. STONE'S RIVER.

THE organization of the two principal western armies—that of the Ohio under Buell, and that of the Tennessee under Grant—was effected about the same time as that of the Army of the Potomac under McClellan, a sketch of which has been given in a former paper.

The Army of the Ohio, or, as it was subsequently called, the Army of the Cumberland, constituted the centre, while the Army of the Potomac and the Army of the Tennessee were the left and right, respectively, of the grand army that stretched across the northern border of the rebellious States from the Atlantic to the Mississippi. This central army, called into existence at and about Louisville, Kentucky, consisted, as first organized, of seven divisions of infantry, each of three brigades. Some had four, but three was the established rule. To each brigade was attached a field battery. In each division one of the battery commanders was designated as chief of artillery, but his functions were, as in the Army of the Potomac, merely nominal, and those of the chief of artillery of the army were simply administrative, not those of actual command. The organization of the artillery, therefore, ascended no higher than the individual battery, the scope of service of which was limited to that of a small body of infantry. There was not, as in the Army of the Potomac, an artillery reserve, or any other body of batteries to compensate for the defects arising from the dispersion of batteries to brigades.

The artillery of this army consisted, at first, and for a long period afterwards, of every variety of gun known to the service, and, for want of proper adjustment of these, the batteries were of mixed calibres and kind—some even had three kinds of pieces, while most of them had two kinds—smooth-bores and rifles, or smooth-bores and howitzers—intermixed. But few had pieces all

of one kind, and this made great confusion and difficulty in the supply of ammunition and other stores.

Buell's army, as thus organized, consisted of 79,334 infantry and 28 light and 2 siege batteries, together with 12 regiments of cavalry numbering 11,496 men, making a total of 94,765 men. The batteries, as a rule, had six pieces each; a few had but four pieces. At first there were no horse batteries, regularly designated and equipped as such. These gradually grew into existence as the cavalry developed and necessity called for their service.

Buell designated four of his divisions commanded respectively by Thomas, "Aleck" McCook, Nelson, and Crittenden, to constitute a movable army, under his personal supervision, and which, after the capture of Forts Henry and Donelson, by the Army of the Tennessee under Grant, was to unite with the latter army, the whole under Halleck, for a projected campaign against the enemy's position at Corinth, Mississippi. This mobilized portion of the Army of the Ohio, with its cavalry and artillery, made an effective force of 37,000 troops. The remainder, about 36,000 effective*, were assigned to the duty of maintaining his long lines of communication, and to guarding avenues of approach through Tennessee and Kentucky to Cincinnati and Louisville.

Meanwhile Grant had organized the Army of the Tennessee and established it in camps at Shiloh, on the Tennessee River, awaiting the arrival of Buell's army and of Halleck to take command of both in the campaign against Corinth, Miss., distant about twenty-five miles. On the sixth of April (1862) the enemy, under Albert S. Johnston, making an unexpected attack on Grant, threw his army into confusion and forced it back upon the landing at the river, where it found shelter for the night behind a line of artillery hastily formed from the remnants of batteries that had been driven back with the infantry, together with some siege-guns which happened most opportunely to be at that place.

Buell, hastening forward, crossed the river with three of his divisions, and, uniting with Grant, drove, on the following morning, the enemy from the field and regained the camping ground of the previous day. In this battle the batteries with Buell took an active part, some of them an heroic part; but there was nothing in the engagement to indicate whether the organization

*The 20,000 men belonging to the army, not included in the above, comprised the sick and non-effectives and the recruits, many not yet armed, in camps about Cincinnati and Louisville.

adopted for the artillery of the Army of the Ohio was, on the whole, good or bad.

Halleck arrived on the 11th, and assuming command, cautiously moved upon the enemy at Corinth, where he arrived on the 30th of the following month. The enemy evacuated the place, part of his troops, under Beauregard, remaining in Mississippi, while the larger part, under Bragg, moved eastward to secure possession of the important strategic position of Chattanooga, from which to operate through the states of Tennessee and Kentucky to the Ohio River. Buell was detached with his army to operate against Bragg's movements, but in doing this he was handicapped by Halleck's instructions to repair and keep open the Memphis and Charleston railroad, running parallel to the enemy's front and easily destroyed by him as fast as rebuilt. These conditions enabled Bragg to reach Chattanooga in advance of Buell; and, screened by the ridges of the Alleghenies, he pushed his way rapidly through eastern Tennessee into Kentucky and was heading directly for Cincinnati and Louisville.

Buell, abandoning Halleck's impracticable railroad project, hastened to intercept Bragg's movements, which he finally did when the latter was upon the threshold of the cities above mentioned, and brought him to bay at Perryville, a village about sixty miles southeast of Louisville. Here, on the 8th of October, 1862, a sharp battle was fought by part of the troops of each army, and proved sufficiently decisive to cause Bragg to continue his retrograde movement out of Kentucky into Tennessee, where he put his army into winter cantonment at Murfreesboro, a village on Stone's River, thirty miles south of Nashville.

After the battle of Perryville, Buell began to concentrate his army at Nashville, a point which, to the end of the war, continued to be of great strategic value; but this action not being approved by Halleck—now acting as general-in-chief at Washington—Buell was relieved from command and Rosecrans assigned to it in his place. The latter, seeing the wisdom of Buell's plans, continued them, notwithstanding the strong and persistent opposition of Halleck.

The order of the War Department making this change of commanders designated this army as the Fourteenth Army Corps, a designation which it held until after the battle of Stone's River, a couple of months after, when it was changed to that of the Army of the Cumberland, an honored name which it bore to the

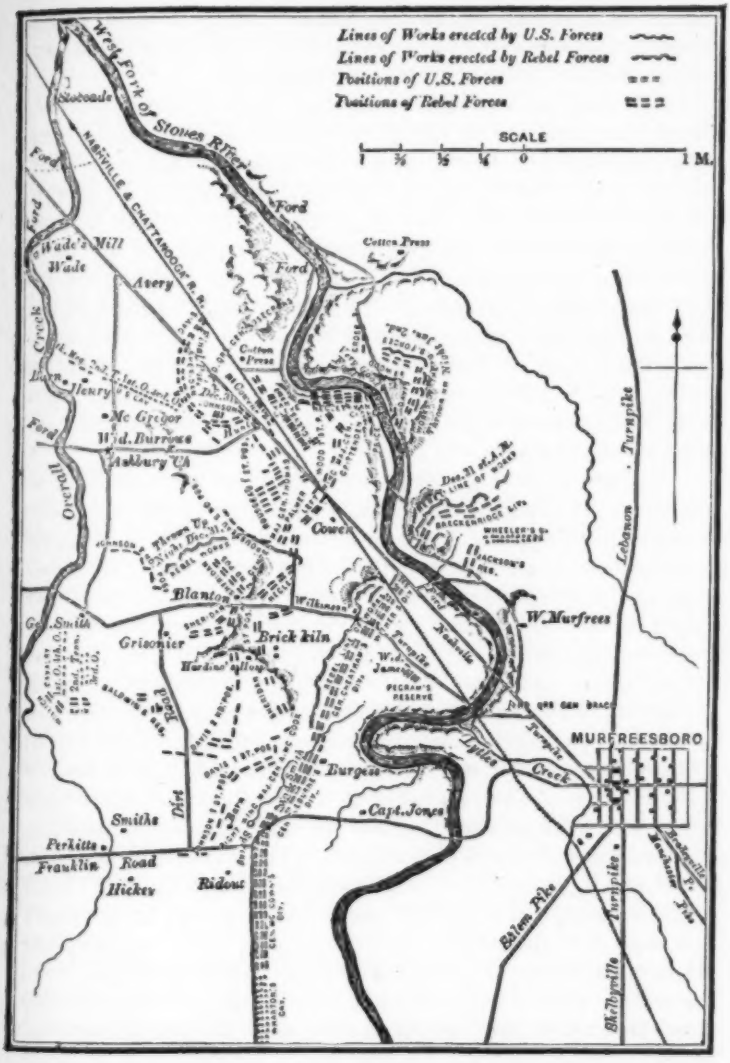
end. Rosecrans organized it—while it was the Fourteenth Corps—into the "Right Wing," the "Centre," and the "Left Wing," commanded respectively by "Aleck" McCook, Thomas, and Crittenden, with five divisions in the "Centre," and three in each of the wings. The organization of divisions remained as before, and the batteries continued assigned to the infantry brigades. Rosecrans had as chief of artillery Colonel Barnett, of the 1st Ohio Artillery, who exercised functions confined entirely to administrative matters, with scarcely the shadow of actual command. Each division had a nominal chief, only one of whom was a field officer—a major—who had *over* him a *captain* as chief of artillery of the "Wing." Colonel Barnett and this major were the only field officers of artillery in this entire army; the senior battery commander in each division, with one exception, acted, or was supposed to act, as its chief of artillery in addition to commanding his own battery. The individual batteries, being assigned to brigades, were under direct control of the brigade commander, or, in fact, of any one superior in rank to their own commanders, who chose to give them orders. They were, as it were, orphans, without any of their own kin to care for them.

General Buell, while he showed marked talent and capacity as an organizer and disciplinarian, and gave to the army which he organized an impress which it never lost, failed entirely to grasp the rôle to be performed by artillery since the introduction of the rifled musket and artillery of greater range and precision. He was a close student, but failed to observe the changes that had taken place since the books which he studied were written. As assistant adjutant-general, and military adviser of Secretary of War Floyd, just before the war, he was the parent of the blunders in reference to artillery matters so pointedly referred to by General Hunt in his paper in a former number of the JOURNAL OF THE MILITARY SERVICE INSTITUTION.

Rosecrans, in taking command of the army continued with vigor the work which Buell had commenced, of repairing the road from Nashville back to Louisville, a distance of 185 miles. This important road had been so thoroughly destroyed by Bragg during his advance into Kentucky that it was not reopened until the latter part of November. During the following month every effort was made to supply the troops with greatly needed clothing, rations, and ammunition, and also to accumulate such quantity of all supplies as to provide against future interruptions. Bragg, ap-

preciative of the importance of this line to Rosecrans, organized large cavalry commands, which he sent under Morgan and Wheeler to break it up. With this knowledge, Rosecrans, on the 26th of December, put his army in motion to attack the enemy at Murfreesboro. Bragg's outlying troops in the direction of Nashville, falling back, resisted by brisk skirmishing the advance of Rosecrans, until, on the afternoon of the 30th, the latter having pushed close up to the main line of the enemy at Murfreesboro, the resistance approximated the magnitude of a battle.

Murfreesboro, a country village near the centre of the State of Tennessee, has no military importance of its own, except that it stands across the Louisville and Chattanooga railroad, the line of approach for Rosecrans to the latter place, the great strategic point aimed for. It is also the centre from which radiate numerous roads through a fertile and abundant country from which the Confederate army drew many supplies. About a mile to the north-westward of the town, flowing northward, is Stone's River, an inconsiderable tributary of the Cumberland. Directly west of the town its course is northward, soon to trend to the north-westward. It was within this bend that was fought the principal part of the battle of Stone's River, or, as the Confederates designate it, of Murfreesboro. In ordinary seasons this river is but an insignificant stream, fordable at almost any point by infantry, and with numerous fords everywhere for artillery. The Nashville railroad, crossing this stream at the town, pursues a straight course almost due northwest. The Nashville turnpike, after crossing the stream at nearly the same point, crosses the railroad at an acute angle and then pursues its course on the west side of the railroad and approximately parallel with it. This turnpike, being Rosecrans' line of communication with his base at Nashville, was of the utmost importance to him; it was furthermore the line upon which he formed his broken troops, and therefore constitutes an important feature of the battle-field. Upon the approach of Rosecrans, Bragg formed his army directly across this road, about two miles from the town, and, with the exception of Breckenridge's Division, the whole of his line was beyond the river from the town. His troops were in two lines, on an undulating eminence in the edge of the woods, with open fields in front. The first line was strongly intrenched; the second was about six hundred yards in rear of the first. On the opposite side of the open fields, also in the edge of the woods and on an



BATTLE-FIELD OF STONE'S RIVER.*

* Reproduced by permission of the firm of Charles Scribner's Sons, from page 103 of "The Army of the Cumberland," by General H. M. Cist,—one of the Scribner series of Campaigns of the Civil War.

undulating eminence, Rosecrans established his line of battle almost parallel with that of his antagonist. The two lines had an average distance apart of about 1200 yards.

Breckenridge's Division, the extreme right of Bragg's army, was on the east side of the river, with its right retired so as to cover that flank and the Lebanon road reaching the town from that direction. On the left of Breckenridge came the division of Withers, with its right resting on the river. To the left of Withers came the divisions of Cheatham, Cleburne and McCown, in the order mentioned. The right wing was commanded by Polk, and the left by Hardee. The extreme right of the line, beyond Breckenridge, was guarded by Wheeler's cavalry, while upon the left was that of Wharton, both exceedingly enterprising in cutting off everything not lying close behind Rosecrans' main line. The lines of each army, exclusive of the cavalry, were about three miles long.

The Federal army was disposed entirely on the west side of the river. The "Left Wing," under Crittenden, consisted of the divisions of Wood, Van Cleve, and Palmer; the first two massed near the river preparatory to the attack contemplated by Rosecrans on the following morning. Palmer was in line, with his left resting on the river and his right extending beyond the railroad and turnpike near their point of intersection. This point became interesting as the scene of some of the most desperate fighting of the battle. Palmer was joined upon his right by Negley's Division of Thomas' command,—the "Centre,"—the other division of which, that of Rousseau, together with Walker's Brigade, was in reserve behind Negley. The remainder of Thomas' command had been left behind to guard Nashville and the railroad back to Louisville.

Next upon the right of Negley came the divisions of Sheridan, Davis and R. W. Johnson, all of McCook's "Right Wing." Each of the divisions on the line had one of its three brigades in reserve as a support to the two on the line. The batteries were with the brigades to which they were attached, and each brigade commander exercised control over his own battery. Rosecrans' line thus consisted of ten brigades and the same number of batteries, *in line*, together with five brigades and a like number of batteries in immediate support. In addition to these, the divisions of Wood and Van Cleve were held in mass with the batteries, to cross the river on the following morning for the purpose of attacking Breckenridge.

The ground occupied by the Federal troops was slightly undulating, rocky, and, with but few exceptions, covered with a dense thicket of cedars, forming a good covering for the movements of infantry, but impracticable for batteries except where roads were cut through. Towards the left and rear, along the turnpike and railroad, the country was more open, and it was here that Rosecrans formed his final line when driven from the first position. The batteries, scattered along the line as just described, were posted according to the individual notions of the respective brigade commanders as to the functions of artillery in a general engagement. Generally each battery was kept intact, but sometimes they were broken, with their sections (two pieces) separated. The sequel will show how this arrangement of the artillery turned out.

Rosecrans' army, as it thus stood confronting the enemy, consisted of 117 regiments of infantry, 18 regiments of cavalry, and 32 batteries of 185 guns. Bragg's army consisted of 107 regiments of infantry, 18 of cavalry, (not counting those of the brigades of Morgan and Forest, absent raiding the railroad) and 24 batteries of about 120 guns. As a rule, the Confederate regiments were stronger than those of the Federal army, and it is therefore probable that the infantry and cavalry of the two opposing forces on this occasion were about equal, while superiority in artillery was greatly in favor of Rosecrans.

In numbers, Rosecrans' returns for December 30th, the day preceding the battle, give his strength as 41,421 infantry, 2223 artillery, and 3296 cavalry, making a total present of 46,940, or an effective for line of battle of about 43,400.

In actual fighting force the two opposing forces were as nearly equal, as to numbers, as it is practicable for armies to be; and in organization they were almost identical. Bragg, like Rosecrans, had his batteries attached to brigades, and neither had any reserve artillery.

Rosecrans proposed to himself to take the initiative, and his plan of battle was to occupy the attention of Bragg's left wing under Hardee by demonstrations with McCook's right wing, while Wood's and Van Cleve's divisions of Crittenden's left wing crossed the river to attack Breckenridge and drive him from the high ground which he occupied, and upon which batteries were to be established to take in flank and rear the main line of the Confederates on the other side of the river. At the same time the

divisions of Palmer and Negley were to move forward to the attack. The whole right of the enemy, thus assaulted in flank and front, was expected to give way, and being doubled back on the left, the entire army was to be driven off to the westward and from its lines of communication, with a view to its utter destruction as a military force.

The only condition deemed necessary for the entire success of this plan was that McCook should hold fast his position on the right for three hours. This McCook assured Rosecrans he was fully able to do. The extreme right was held by two brigades—Willich's and Kirk's—of Johnson's Division, which, for the purpose of covering the flank, were retired almost at right angles with the line of Davis' Division, the one next on the left. Johnson had his headquarters a mile and more in rear, through the cedar brake, and here he had his reserve brigade with its battery. Willich and Kirk had their batteries with them, but not in position to guard against surprise. McCook had no chief of artillery to give even a nominal supervision over the batteries of his wing; neither did Johnson have a chief. Everything was left to brigade commanders, to be managed in their own way. Captain Edgarton, commanding an Ohio battery attached to Kirk's Brigade, says in his report: "General Kirk pointed out a spot about 100 yards in the rear of the position I then occupied, sheltered by a heavy growth of timber, and ordered me to bivouac there for the night. I represented to him that I could not place my guns 'in battery' there, or defend myself if assaulted. He replied that I should be protected, and that ample notice should be given when I was expected to take a position in line of battle. After I had brought my guns into park, the right of the brigade was thrown across the muzzles in front." This was a fair sample of the posting of batteries along the whole line. When the surprise came this captain managed to get in a few shots, but was soon overrun by the enemy and he and all his guns captured.

The right flank of McCook's wing, held by Johnson's Division, rested on no natural obstacle and no artificial one was created for it; it was virtually in the air. Rosecrans had no reserve artillery with which to strengthen any weak point: but even had Johnson's three batteries been properly posted and united, and the infantry supporting them intrenched and on the alert, Hardee could not have overrun this flank as he did, and McCook could probably have held the position for the appointed three hours.

Rosecrans did not personally inspect this part of his line nor send any competent person to do it for him. He left it all to McCook, who seems to have left it to Johnson, who had his camp beyond reach of the direct supervision of his troops.

During the night of the 30th, Bragg formed his plan of battle, almost an identical counterpart of that of Rosecrans. Hardee, on the left, was to advance McCown's and Cleburne's divisions against Rosecrans' right,—held, as we have seen, by McCook's wing,—which being broken and thrust back, Polk was to advance Withers' and Cheatham's divisions and force back the centre; the whole movement to be made by a steady wheel of the entire line on Polk's right as a pivot. By this plan McCook's "Right Wing" was to be driven back and upon the centre and left, and the whole line finally driven from its communication with Nashville, and to utter defeat.

Rosecrans' order was to commence the movement at seven in the morning; Bragg's to attack at daylight, which gave him a start of about a half hour of his adversary, and this start gave Bragg the initiative, and was decisive of the events that followed.

Promptly at the appointed hour Wood and Van Cleve started with their divisions, and were partly across the river when the sound of battle announced an attack by the enemy upon the extreme right. Soon Rosecrans received intelligence that his right wing was broken and fast crumbling to pieces to the rear. This at once threw him upon the defensive, and it was necessary to arrest further movement on the left. The half hour's start of his adversary that Bragg got, changed every phase of Rosecrans' plans. Wood's and Van Cleve's divisions were immediately recalled and hastened towards the right and rear to assist in checking and repelling the enemy, now gaining such alarming headway in that direction.

At half-past six o'clock Hardee commenced to swing the divisions of McCown and Cleburne around to envelop McCook's right flank. While the ground was quite unknown to the Federals, it was entirely familiar to their opponents, a circumstance giving great advantage on a field so intricate with woods and thickets. Mention has already been made of the defenseless condition of McCook's right. Although pickets guarded the front and flank a short distance out, there was otherwise but little vigilance or preparation, as if in a state of expectancy. Willich had gone to see his division commander a mile and more to the

rear, and the battery horses had been sent to water. The pickets were driven in by the steady rush of the enemy, who swept through the brigades of Willich and Kirk like a tornado. Two of the guns attached to Willich's Brigade were "in battery" guarding a road from the westward; the other four were in park, in rear of the infantry. A few discharges of canister were fired from most of these pieces, but soon three of them fell into the hands of the enemy; two others stampeded with the infantry through the cedars, while the remaining one, under the battery commander, fell back, and from time to time joined in attempts made to check the enemy. The battery with Kirk's Brigade came "in battery," and as soon as its front was cleared of the stampeding infantry, fired a few rounds of canister, and then fell into the hands of the enemy—captured entire. Its captain, one of its lieutenants, and many of its men, were wounded and captured at their pieces, while a number were killed.

The battery attached to Johnson's reserve brigade encamped in the woods far to the rear, hastened forward as soon as possible, and met the enemy in hot pursuit of the other two brigades. After a gallant fight, during which its infantry support fell back, it, too, was forced to retire, with the loss of two pieces and many men and horses disabled.

Everything considered, these three batteries did all that could be expected of them under such disadvantageous circumstances. It is easily imagined, and not improbable, that if the eighteen guns of these batteries had been united in one mass, and well supported by infantry strongly intrenched, McCook's right would not have been routed incontinently as it was. Bragg's active cavalry and scouts had discovered the loose condition of things on the extreme right, and his attack was made with the confidence of assured success. In every essential respect the break of this wing was similar to the rout of the Eleventh Corps at Chancellorsville.

Johnson's Division being driven from its position on the line, uncovered that of Davis, the right brigade of which, Post's, joined on to Johnson's left brigade. Woodruff's Brigade was on the left of Post, while Carlin's was in reserve. As soon as possible Post's Brigade was swung back to face the enemy, now approaching from that direction. Pinney's Wisconsin battery, attached to this brigade, changed its front to conform to this movement, and came "in battery" in a corn-field where it opened a spirited fire

upon the enemy, exultant over the hasty rout of Johnson's Division but now temporarily checked by this fire and that of the infantry. Soon, however, the infantry began to melt away and the battery was compelled to retire, leaving its captain and a number of wounded men in the hands of the enemy. Owing to the disabling of many horses one of the pieces had to be abandoned, while the remainder were hauled off chiefly by hand.

Hotchkiss' Minnesota battery was attached to the reserve brigade, but during the night had an advanced position, from which it was withdrawn just before daylight. When the attack fell upon this brigade, forcing it to fall back across an open field to the edge of the woods where it made a momentary stand, the battery was enabled to fire a few rounds. The brigade then retired about a mile and made another brief stand in the edge of a cedar thicket from which it again soon retired to the final position near the Nashville turnpike. This battery lost no guns.

Carpenter's Wisconsin battery was attached to Woodruff's brigade, which connected with the right of Sill's Brigade of Sheridan's Division. The brigade commander had this battery divided into half batteries but with only one piece in position. The brigade made a determined resistance for a few minutes and the battery was enabled to do some good work before being forced to retire. The captain and a number of men were killed and a number of men and horses disabled, but no guns were lost.

Here was another block of three batteries rendered almost useless by the manner in which they were dispersed along the line.

Davis' Division made a stubborn resistance, but its position in line brought it in front of Cheatham's Division which now made an assault upon it in front while the divisions of McCown and Cleburne, having swept Johnson away, were attacking it in flank and working around to its rear. The enemy speaks of this as being one of the hotly contested points of the battle; but Davis was unable to withstand this overwhelming attack upon his front and flank, and being forced back uncovered Sheridan's right. Sheridan up to this time had been hotly engaged with the enemy in front, but was compelled now to change front to meet the new danger upon his flank. Before making this change of front his three batteries had been posted with their brigades in the usual way and were actively engaged, but in making the change of front, which was a difficult manœuvre through the thickets and

under the assaults of the enemy, the batteries became shaken loose from their brigades and naturally gravitated together and towards some open space at the angle formed by Sheridan's Division in its new position, and that of Negley still on the original line and next on Sheridan's left. It so happened that two of Negley's batteries, not able to find positions with their brigades on the line by reason of the density of the cedars, were on this flank at the open space, now the angle, making in all a battery of 30 pieces, which for nearly four hours resisted the most desperate efforts of the enemy.

The Confederate General Polk, referring in his report to this position, says: "His batteries, which occupied commanding positions, and enabled him to sweep the open field in his front, were served with admirable skill and vigor, and were well supported." He then describes the terrible effect of their fire, and goes on to say: "Nothing but a charge could meet the demands of the occasion. Orders were given to take the batteries at all hazards, and it was done. The batteries, two in number, were carried in gallant style. Artillerists were captured at their pieces, a large number of whom and of their infantry support were killed upon the spot."

Withers, commanding one of Polk's divisions, says of the same thing: "Opposite there were three batteries strongly supported by infantry. The capture of the batteries and rout of the supports was a necessity. Anderson was, therefore, directed to take the batteries at any cost." He then describes how he reinforced Anderson, and the fire to which his troops were exposed; how they were repulsed several times, but finally succeeded in driving the infantry supports and capturing six guns of one battery, and two of another. He mentions his losses in doing this as something phenomenal.

Sheridan, after describing his change of front, says: "In this position I was immediately attacked, when one of the most sanguinary contests of the day occurred." After describing the advance of the enemy over the open ground with his lines and masses of infantry and three batteries of artillery, he again says: "The contest became terrible. The enemy made three attacks, and were three times repulsed, the artillery range of the respective batteries being not over 200 yards."

The charge of the enemy that captured the eight guns broke the angle held by the artillery, and the loss of this caused Sheri-

dan's whole line to fall back through the thicket to the new line now forming along the turnpike. The stubborn tenacity with which Sheridan had held his position—it was now about 11 A. M. —enabled Rosecrans to make such disposition of his available troops as to establish a new line along the Nashville turnpike. Upon this line the scattered fragments of Johnson's and Davis' divisions were now being rallied, and it was to this that Sheridan's Division retired, but not entirely unmolested by Hardee's divisions which, by this time, had worked their way well around in Sheridan's rear.

The divisions of Davis and Sheridan were of about equal strength, and composed of the same kind of troops; they were, in fact, approximately identical, and fought with equal skill by their gallant commanders, but with vastly different results. The former was forced to yield the ground after a brief but brave struggle: the latter held on against even greater odds for nearly four hours, and then was forced to give way only because the position held by his artillery was broken and some of his guns captured. The only reason apparent for this difference is—and it is certainly a logical one—that by a fortuitous circumstance Sheridan's batteries were shaken loose from the brigades to which they were attached, and by still greater good fortune were united at a point where their massed fire held the enemy in check until their position was carried by successive assaults of the enemy. Davis' batteries remained scattered, and gave, in consequence, but little support either to each other or to the infantry; nor could they deal upon the enemy the stunning blows of guns in mass.

This was a momentous crisis in the events of the battle. It was of vital moment that the break in the right wing should not extend itself to the centre and left until a new line could be established to stay the further progress of the enemy. This was done by the batteries that had so fortunately come together at the angle between Sheridan and Negley; they were Houghtaling's 1st Illinois, Bush's 4th Indiana, and Hescock's 1st Missouri, of Sheridan's Division, and Marshall's and Shultz's, of Negley's Division, both of the 1st Ohio Light Artillery. Houghtaling, after losing his battery, joined his remaining men to batteries that were short handed, and did further noble work in the fight.

While Sheridan was so stoutly holding on in the manner just related, Rousseau, whose division of Thomas' command, held as a reserve, was sent through the cedar brake to the right and rear

of Sheridan to check the progress of the enemy now following closely upon the broken divisions of Johnson and Davis. Rousseau had but two batteries with him at this time—Loomis' 1st Michigan and Guenther's 5th U. S. Artillery, both attached to brigades—the other battery being absent with Starkwether's Brigade, guarding a ford several miles down the river. Rousseau, deploying the two brigades with him, advanced into the cedar thicket. The batteries endeavored to follow their brigades, but found it impossible to do so on account of the density of the growth. Guenther, attached to Shepherd's Brigade of regulars, pointing out this fact to Thomas, who was present with Rousseau, was directed by him to take position, together with Loomis, in the open field, where their batteries would be of service in the event of the repulse of their brigades, a thing that did soon happen, and most bloodily, too.

These two brigades encountered a large part of Hardee's wing, and besides being vastly outnumbered, were at a still greater disadvantage on account of the dense growth of small trees or shrubs covering the field. The Confederate troops, from habits of life, being accustomed to the brakes, jungles, and hummocks of the South, were more at home in such a situation than those of the North, and man to man were superior to them in such thickets as those in which this fight took place.

The brigades were forced back out of the thicket closely followed by the enemy. As soon as the fronts of the batteries were cleared of their friends, the guns opened with canister, causing the enemy to retire hastily to the concealment of the thicket. This enabled the infantry to rally and form line upon the batteries. Of this Rousseau says: "As the enemy emerged from the woods in great force, shouting and cheering, the batteries of Guenther and Loomis, doubled-shotted with canister, opened upon them. They moved straight ahead for awhile, but were finally driven back with immense loss. In a little while they rallied again, and, as it seemed, with fresh troops, and assailed our position, and were again, after a fierce struggle, driven back. Four deliberate, and fiercely sustained assaults were made upon our position and repulsed."

Not only did Loomis' and Guenther's batteries check and repulse the enemy at this crisis, but they formed the nucleus of a line upon which other batteries and troops formed, until the position proved impregnable to the enemy. This was the second line,

and owed its existence largely, if not entirely, to the seemingly trifling circumstance that Guenther was directed by Thomas to put his battery in a certain position with reference to the thicket into which the brigades penetrated. The ordinary course would have been for Guenther and Loomis to have struggled as best they could after their brigades into the brake with their batteries, where, unable to do any service, they would inevitably have been captured. But Thomas, himself a veteran artillerist and a thoughtful man, directed differently, and the result was most fortunate for the Federal army.

So urgent was the demand for troops to check the enemy, now seemingly upon the verge of breaking Rosecrans' army to atoms, that Morton was sent with his engineer brigade to join Rousseau's brigades on the right. Attached to Morton's Brigade was Stokes' Chicago battery, which, wisely abstaining from entangling itself in the thicket, took position on the right of Loomis and Guenther. At the same time the two brigades of Van Cleve's Division, lately recalled from the other side of the river, were also hastened to the right next to the engineer brigade. One of the two batteries of these brigades—Swallow's 7th Indiana—followed its brigade as far as possible into the thicket, where, fortunately finding some open ground, it was enabled to do some good firing, though ineffectual in checking the enemy. When his brigade was driven back, Swallow, by great effort and good fortune, saved his battery, which he then placed upon Guenther's line. Stevens, commanding a Pennsylvania battery with the other brigade, referring in his report to this part of the battle, says: "We found everything there in confusion, and it impossible to follow our brigade, and the battery nearly in the lines of the enemy. You [his brigade commander] then gave me permission to fight on my own hook and do the best in my power." With this he, too, placed his battery on Guenther's line.

Harker's Brigade, of Wood's Division, came up with its battery on the right of Van Cleve's brigades. Harker thus describes the situation, as he then found it: "On approaching the right, much confusion was visible; troops marching in every direction; stragglers to be seen in great numbers, and teamsters in great consternation endeavoring to drive their teams they knew not whither. My progress was impeded by the confusion, while the enemy was pouring shot and shell upon us from at least three different directions." Extricating his brigade from this confusion

he passed on and took position on the extreme right, where he immediately deployed his brigade, and, moving to the front, soon encountered the enemy in great force. These he promptly engaged, and, sending his battery to as favorable a position as he could find, resolutely baffled the enemy in every effort to get further around on that flank, until by the falling back of Van Cleve's brigades, he, too, was forced to withdraw, in doing which his battery—Bradley's 6th Ohio—lost, temporarily, two of its guns. They were immediately retaken by a gallant charge of the 13th Michigan. Bradley then established his battery on Guenther's line.

This was decidedly the most critical period of the battle, and had it not been for the thoughtful circumstance of withholding Guenther and Loomis from following their brigades into the entanglements of the thicket, and posting them on ground favorable for their fire, which they were able to hold until other batteries and troops formed upon them, the whole of Rosecrans' army would have been routed. Although the line thus formed was, so to speak, an accidental line, it was the best that could have been taken under the circumstances, even after a most careful selection. It covered, still, the turnpike, Rosecrans' communication with Nashville, and was upon ground more open and favorable for the artillery which soon proved to be his chief reliance. The broken divisions of Johnson and Davis were collected here, and what artillery they had remaining was added to that already in position, making altogether a battery so formidable as to resist every assault of the enemy.

The Confederate commanders give due credit for the obstinate resistance they met with before reaching this point, but it was here and by these batteries that they first met with a check that arrested them entirely. Hardee, after describing how he collected and reformed his troops, and replenished their ammunition, says: "It was now past 3 o'clock. In moving through the open ground to drive the enemy from the last positions they held, near the railroad, a fierce and destructive enfilading fire of artillery was poured upon the right of Cleburne's Division from batteries massed near the railroad embankments. At this critical moment the enemy brought up a fresh line to oppose our wearied troops." This line was in reality the new line formed as just described. Hardee then goes on to describe how he was repulsed, and returning twice, was again each time repulsed, until he finally abandoned further attempt to carry this part of the Fed-

eral position. He says: "The enemy lay beyond the range of our guns, securely sheltered behind the strong defense of the railroad embankment, with wide, open fields intervening, which were swept by their superior artillery. It would have been folly, not valor, to assail them in this position." This closed the fighting on the right, for this day—December 31.

Hardee, in his report claims that in woods and brush the Confederate infantry is superior to Federal infantry, but concedes that in open ground, where artillery can have full effect, its superiority gives the latter a decided advantage. The same view was held by all Confederate commanders who, whenever practicable, endeavored to secure the advantage of woods in which to fight.

When Sheridan was forced back and the batteries at the angle between his division and that of Negley were driven from their position, as previously described, the right of Negley was, in its turn, exposed to the onward push of the enemy. His and Palmer's divisions, the only two now remaining on the original line, were assailed by every available man and gun of Polk's wing, and the most persistent efforts were made to crush in this remainder of the Federal line. Palmer's batteries were scattered in the usual way with their brigades, and, although most gallantly served, failed to deliver such telling blows as fell from Sheridan's group of batteries. Negley fell back almost immediately after Sheridan, and Palmer soon followed, both taking position on the new line along and in front of the Nashville turnpike.

Rosecrans' entire army had now changed position. From being across and at right-angles with the Nashville pike it was now parallel with it. The left still rested on Stone's River, near its former position, while, upon this as a pivot, the whole line had swung back through a quarter circle. The new line, situated on comparatively open ground somewhat elevated and undulating, was hastily intrenched, and the troops occupied it relatively almost as before; that is, McCook on the right, Thomas in the centre, and Crittenden on the left.

Rosecrans had lost, during the early part of the day, 28 pieces of artillery, which, falling into the hands of the enemy with a considerable quantity of ammunition, about equalized the artillery strength of the opposing forces. His remaining 157 pieces, or a majority of them, were now in position on the new line. For the management of this artillery there were but two field officers, the colonel and major before mentioned, neither of whom had

had much experience in this branch of the service, nor on this occasion exercised much authority in directing it. Happily, however, Crittenden's chief of artillery, Mendenhall, although but a captain, rose to the occasion and assumed command of the batteries on the left, which he managed in such manner as to derive from them the greatest efficiency.

Polk still continued his utmost endeavors to crush and roll back the left of Rosecrans' new line. Breckenridge's Division was brought from beyond the river to assist in this, "but the time lost," says Polk, "enabled the enemy to recover his self-possession, to mass a number of heavy batteries, and concentrate a strong infantry force on the position, and thus make a successful attack very difficult." He, however, made several desperate assaults, all of which were repulsed with great slaughter on both sides. The Confederate reports agree that these repulses were due to the concentration of artillery fire upon their masses. Bragg says: "We succeeded in driving him from every position except the strong one held by his extreme left flank, resting on Stone's River, and covered by a concentration of artillery of superior range and calibre, which seemed to bid us defiance." It was in reality the very same artillery that he had met earlier in the day, and which he had driven back with the infantry to the position he was now endeavoring to take; the only difference being that in the disasters of the forenoon the batteries, to a great extent, had become shaken loose from their brigades, and thus became able to act as batteries should. They were now in hand and ready for concentrated action.

The contracted line now occupied by Rosecrans necessarily concentrated the batteries and gave to their fire the effect of artillery in mass. It was this that repelled the enemy. The subtle influence of moral effect came in to reassure the infantry, which now stood in equal readiness to meet the enemy.

The ammunition trains had fortunately escaped the swoop of the enemy's cavalry, and taking refuge behind the new line, were in convenient positions for replenishing the exhausted boxes of the infantry and the chests of the artillery. The batteries that had been scattered or damaged were brought together and put in condition for further service as rapidly as possible. Mendenhall, taking chief charge of those upon the right, posted them to the best advantage. The captains of those upon the left, being without any specific head, did, each for himself, the best

that he could. It will be remembered that there was no organization of the artillery higher than that of the single battery, and that all these were scattered to brigades, from which most of them had become separated during the operations of the day among the cedar brakes. As might be supposed, battery commanders were subjected to orders and counter-orders from almost any one who chose to give them. This idea is expressed in the report of Parsons, one of the battery commanders, who had been ordered to occupy a certain position. He says: "During the night and on the next morning I was ordered by different officers to resume my previous position. I was obliged to decline obeying these orders, owing to those I had received from Captain Mendenhall, directing me to await his own. The position in which I was placed by this conflict of orders was exceedingly painful, but I found myself justified by subsequent events." These events were those attending the final attack made by the enemy for the purpose of establishing batteries on the high ground on the further side of the river for the purpose of enfilading the Federal position, which object was frustrated by this officer and others whose batteries were thus posted for this purpose. Almost every battery commander will recognize in this incident, like perplexities in his own experience.

Captain Mendenhall, chief of artillery of the left wing, soon got 43 pieces into position on the elevated ground overlooking the river and covering the left flank. These guns were added to from other corps until they numbered, in all, 58 pieces.

Hardee having failed to force the right of the new line, Polk now redoubled his efforts against the left, the key-point of which was a wooded knoll known as the "Round Forest" situated in the acute angle formed by the crossing of the railroad and turnpike. Around this position the fighting was desperate. In addition to his masses of infantry the enemy brought to bear upon it all of his available artillery, but to no purpose, except to add to the slaughter. The brigades of Hazen, Cruft, Hascall and others, stood resolutely to their work and gave ample support to the batteries coöperating with them. The enemy made several distinct assaults each one of which was signally repulsed. How this was done is best stated in the words of Bragg, who says: "Upon this flank, their strongest defensive position, resting on the river bank, the enemy had concentrated not less than twenty pieces of his heaviest artillery [There were in reality more than

double this number], masked almost entirely from view, but covering an open space in front of several hundred yards. Supported right, left, and rear by heavy masses of infantry, this position proved impracticable, and after two unsuccessful efforts the attempt to carry it by infantry was abandoned. Our heaviest batteries of artillery and rifled guns of long range were now concentrated in front of, and their fire opened on, this position. After a cannonade of some time the enemy's fire slackened, and finally ceased near nightfall,"—he might have added, because his batteries were driven away.

This closed the battle for this day. Bragg established his troops in a line parallel with that of the new position occupied by Rosecrans, and strongly intrenched it. Breckenridge's Division was returned to the further side of the river to prevent the Federals from making any movement in that direction. During the night Rosecrans had all of his reserve ammunition issued, and finding that he had still enough for another day's fighting resolutely determined to hold his position and await results.

Bragg's batteries, although actively handled and well served, failed to accomplish the work due from them. Like those in Rosecrans' army they were attached to brigades, and thus dispersed without proper command, could act but feebly. No fortuitous circumstances brought them together in groups whereby their fire could be more effective. Bragg was quick to perceive this defect, and before the opening of the next campaign adopted the battalion system of Lee's army at Northern Virginia.

The battle was not renewed, as a general engagement, on the following day—January 1st—but, instead, the enemy made close reconnoissances of the Federal position. Each time, however, that he showed himself in any considerable force in front of the cedar thicket in which he was screened, the Federal batteries forced him to retire hastily. In the afternoon Van Cleve's Division of Crittenden's Corps was sent across the river to occupy the high ground that dominated the left of Rosecrans' line, and which, in possession of the enemy, would afford him means of enfilading the whole of Rosecrans' line. The other divisions of this corps were moved up near the river in support of Van Cleve, who deployed his brigades at right angles with the river along a low ridge, the summit and sides of which were somewhat open fields.

At daylight on the morning of the 2d, Bragg gave orders to his corps commanders to feel the Federal position, and ascertain

the disposition thereon of the troops. Accordingly, a number of batteries were advanced at several places, supported by large bodies of infantry; but these were all speedily driven back to their cover by the Federal batteries, in readiness and ever on the alert against any movement of the enemy.

The position on the further side of the river, held by Van Cleve, was menacing to Polk's flank, and Breckenridge was directed to dislodge him and crown the ridge with artillery, for the double purpose of saving Polk's flank and of enfilading the Federal line; and for this purpose ten Napoleon guns were sent him in addition to his own batteries. Breckenridge formed his troops for the attack in two lines about two hundred yards apart, with the artillery between. Captain Robertson, in charge of the ten Napoleons, remonstrated against this arrangement for the artillery, arguing that it could do no good in such a position; that, while it would embarrass the movements of infantry, it would itself be powerless to act because of being covered by the front line. He was, however, overruled in this, and the batteries took the position indicated. In this order the force advanced and soon struck Van Cleve's right brigade, resting on the river. This brigade offered stout resistance for a few minutes; but the numbers against it being too great it fell back in confusion, followed by the other two brigades, all in consternation, across the river. When Breckenridge's troops showed themselves on the ridge, exultingly following Van Cleve, it looked as though Rosecrans' left was doomed to destruction, and that his entire line would again be forced from its position, and this time probably to dispersion. But, at this critical moment, Mendenhall's 52 guns opened with an effect thus described by Crittenden in his official report. He says: "They [Breckenridge's troops] cannot be said to have been checked in their advance—from a rapid advance they broke at once into a rapid retreat." Here was presented the strange spectacle of two large bodies of armed men running from each other in the utmost consternation. The left of Breckenridge's lines moving to the attack among the trees along the river bank, came under the fire of the infantry on the opposite side and were slaughtered unmercifully. Other troops crossed over to take the place of Van Cleve's Division, and pursued the flying enemy until dark.

Breckenridge failed to get his artillery into position. Captain Robertson states that the batteries were overrun by the fleeing

infantry before they could be placed "in battery," and in addition were so exposed to the artillery fire from the opposite side of the river that they were forced to leave the ground as rapidly as possible, leaving behind them three pieces. The batteries halted on the edge of a wood, hoping to establish a line upon which the infantry would rally, but the latter abandoned the field in spite of every effort to restrain them. The batteries now drew all the fire and they, too, had to retire still further; and, finally, after dark drew off altogether. Robertson says: "The contagion of flight had spread to the artillery, and it was with great difficulty that several pieces were brought away, owing to the drivers being frightened. * * * There was no organization that I could see or hear of until after the enemy had been checked, [drew off from pursuit, he should have said] save in the artillery. I have never seen troops so completely broken in my military experience." The unwilling testimony of other Confederate witnesses confirms this lurid picture, showing the effect that Mendenhall's guns had when massed upon these troops—the flower of the Confederate army. Breckenridge, after describing how he routed Van Cleve's Division, goes on to say: "It now appeared that the ground we had won was commanded by the enemy's batteries, within easy range, on better ground, on the opposite side of the river. I know not how many guns he had. He had enough to sweep the whole position from the front, the left, and the right, and to render it wholly untenable by our force present of artillery and infantry. * * * We lost three guns, nearly all the horses being killed, and not having the time or men to draw them off by hand. One was lost because there was but one boy left (Private Wright of Wright's battery) to limber the piece, and his strength was unequal to it."

The repulse of Breckenridge was the well-defined effect of artillery in mass. There was no infantry or cavalry combined with it; it was all artillery, pure and simple, and differed essentially from the occurrences of the first day's battle in the right wing, where the batteries, being scattered with brigades, were able to afford but feeble resistance, and all, infantry and artillery, were swept away

After the repulse of Breckenridge, Rosecrans hurried across the river a strong force, consisting partly of Crittenden's and McCook's troops, and made a permanent lodgment on the ground from which Van Cleve had been driven. These troops hastily

intrenched themselves, and Bragg, realizing their threatening attitude, sent Hardee across with reinforcements for Breckenridge, but Hardee desisted from any serious attack.

To prevent troops being sent to assist Van Cleve against Breckenridge's attack, Polk made heavy demonstrations—in fact a formidable attack—upon the Union right on the opposite side of the river. Seven of his batteries were moved forward to a rise of ground near "Round Forest," and, while Mendenhall's batteries were engaged in dispersing Breckenridge, succeeded in gaining a lodgment for their infantry in the "Round Forest," but were unable to gain further ground. The fighting of the infantry at this point was of the most determined and sanguinary nature.

During the following day, January 3d, but little more than picket firing was indulged in by either side, but this was close and searching. The Federal batteries were kept on the alert, and each time any considerable body of the enemy showed itself in front of the thicket it was pelted back. Neither commander felt himself in condition to renew the battle, and during the night of the 3d, Bragg silently withdrew, taking the road to Tullahoma, another point on the railroad about thirty miles nearer Chattanooga.

This action on the part of Bragg gave to Rosecrans the prestige of victory which, up to this time, was decidedly in favor of the Confederates. Bragg gave as his reason for it, that he was led to believe from the reports of his cavalry commanders—operating in Rosecrans' rear—that heavy reinforcements for the latter were near at hand, and that these would make him so strong as to enable him to resist all attacks; and that he could not await an attack from Rosecrans, because of the low state of his supplies, and the care necessary for his sick and wounded. Most of the latter were, however, left behind, and had to be cared for by the Federals.

Rosecrans, on account of his exhausted supplies, was unable to give pursuit. Every step he took in that direction carried him still further from his base, communication with which was constantly infested by Bragg's overwhelming force of cavalry. He accordingly cantoned his army for the winter at Murfreesborough, where he remained until the 23d of the following June, when he resumed his movements against Bragg who had his army strongly intrenched at Tullahoma.

Such was the battle of Stone's River, a battle which presents to

the military critic some interesting and remarkable features, among which may be mentioned the fact that the numbers of the contestants was as nearly balanced as it is practicable to have opposing armies, neither of which was so situated as to receive assistance beyond his own immediate lines. In this respect it was a square fight, in which every division, brigade, regiment and battery of both sides participated. Every organization was represented in the list of losses, and these, in the aggregate, were about equal, and represent a percentage—about twenty-five per centum—seldom reached in European battles, and but rarely excelled in any of the great battles of the Civil War.

The most remarkable features of the battle were the fortuitous circumstances attending the service performed by the artillery of the Federal Army, whereby it was enabled, at each crisis, to turn what seemed to be inevitable disaster into final victory. A recapitulation of the foregoing account will more fully elucidate this fact. When the two armies were drawn up facing each other for battle, the commander of each formed a plan of battle almost the counterpart of the other. Each was to make a vigorous attack with his left wing, with a view to breaking his opponent's right, which was to be rolled back upon the left and eventually to utter rout and disaster. Both commanders commenced to move at about the same time in the morning; but Bragg struck first, and thus gaining the initiative, at once threw his opponent upon the defensive and upset all of his hopeful plans. Rosecrans' extreme right, taken culpably unawares, made but slight resistance, and this, exposing the right, enabled the enemy to push his way to the right and rear of the line still remaining intact. To meet this flank attack, Sheridan swung back his division, thus making an angle with Negley's Division of the original line. Sheridan's three batteries had been arranged in the usual way with his three brigades, but in the change of front became detached in consequence of the cedar thickets, and by a fortunate circumstance gravitated towards the angle before mentioned, where they united with two batteries of Negley's Division which happened to be at that position because they, too, could not follow their brigades by reason of the thickets. This formed a battery of thirty pieces, which, notwithstanding the most desperate efforts of the enemy, held him in check for near four hours, and until another fortuitous circumstance brought other batteries into position to check the enemy effectually at the moment when Bragg's plan for

breaking up the Federal Army was in full tide of success. This was the turning point of the battle. The seemingly insignificant circumstance that prevented Guenther's and Loomis' batteries from following their brigades into the thickets, instead of which they posted themselves by Thomas' direction in the open field, and thus formed a nucleus for other batteries prevented in like manner from accompanying their brigades into the woods, was the culminating point of the contest. The enemy, following closely upon the Federal brigades into the open field, got no further than the effective canister range of these guns. The infantry, reassured by this, reformed and gave much needed support to the batteries. Thus a new line sprang into existence at a moment when all was seemingly lost. By sheer accident these batteries were cut loose from their brigades where they could do little or no good, and instinctively took position where they did the most eminent service. These were the main features of the battle of the first day, in which it is easy to perceive the very important part enacted by the artillery.

The high ground on the opposite side of the river was an object of much concern to both commanders. Rosecrans sent Van Cleve's Division to occupy it; Bragg sent Breckenridge to dislodge Van Cleve and to crown the eminence with artillery. Van Cleve's brigades retired in haste before Breckinridge, but when the troops of the latter came into view and under the fire of Mendenhall's guns they retired in still greater confusion and haste. It was these guns and nothing else that prevented Breckenridge from carrying out his designs, and planting his batteries where they would have been disastrous to the Federal line. Polk, to assist Breckenridge and prevent troops from being sent to the assistance of Van Cleve, made the most desperate assaults possible, with all the troops at his disposal, to break the Federal left at and about "Round Forest," all of which were repulsed by the combined efforts of the infantry and artillery. These were the principal events of the second day's battle, which was the end of the fighting; and here again it will be observed that the artillery did most conspicuous service.

There was perhaps no general battle during the entire war in which the infantry, as a whole, performed its part better than at Stone's River, and it is no detraction from its superb conduct to claim for the artillery the credit so justly due the latter. The Federal batteries were handicapped at the start by their disper-

sion to brigades. So soon, however, as disaster had destroyed this faulty arrangement and given them freedom from such unnatural restraint, they naturally united for the common good, with the results just stated.

Soon after this battle the three grand divisions of the Army of the Cumberland,—designated in the battle as the "Centre," the "Right" and the "Left" wings,—were constituted the Fourteenth, Twentieth, and Twenty-first Army Corps, commanded respectively by Thomas, "Aleck" McCook, and Crittenden. A fourth, or provisional corps, under Gordon Granger, was organized, which soon afterwards took the permanent designation of the Fourth Corps, into which the Twentieth and Twenty-first were subsequently merged. The original Fourth Corps of the Army of the Potomac, commanded by Keys, was discontinued and its troops transferred to other organizations.

The artillery of this army continued attached to brigades, as before. Nothing in the way of better arrangement or organization seems to have been suggested for it by the striking events of Stone's River. It was not until after the events of Chickamauga that any change was made looking to a more efficient organization. The next paper will be a sketch of the operations of the artillery in that remarkable battle.

IS THE TENDENCY OF MODERN DRILL REGULATIONS SALUTARY?*

By CAPT. W. V. RICHARDS, 16TH U. S. INFANTRY.

FOR the purposes of this essay it is assumed as a premise that the tendency of modern drill regulations is to individualize the subordinates, and that such individualization must of necessity be at the expense of the direct influence of the commander; for, as I hold it to be an axiom that the more a man is taught to think and act for himself, the less he is apt to be governed by the thoughts or actions of others; the more apt a subordinate becomes in acting upon his own judgment, the more loth he will be to be governed by the judgment of others. And does it not follow that the more perfectly the tendency of modern drill regulations is instilled into an organization the more it will be governed by individual thought, the less by its commander? Granted the premise, the above query suggests itself.

It is not my purpose to answer this question. Its theories are in print, and are being experimented with. The results will never be known until they have been put to the crucial test in war. I hold that while there has been a tendency towards individualization in late wars, it has never gone below the commissioned grades. Extending this to the grade of corporal is advanced by modern theorists, not only in our country, but in warlike Europe. Can the unit be reduced to a squad? Can the direction of a line of battle be entrusted to a corporal? Can the methods of advance in the final effort of assault—whether by rushes, or a general rush upon the enemy—be left to each individual captain in a long line of battle, without reference to the judgment of the commander of the whole line?

If the most perfect results can be obtained from complete individualization—*yes*. If concert of action by the masses, directed by the skill born of education and experience, the quick eye, the indomitable will and valor of the chief, is necessary—*no*. If the former, a squad base will do. If the latter, a base of sufficient strength to obtain the objects sought must be the unit, and that

* Read before the Officers' Lyceum at Fort Douglas, Utah.

unit, as in the squad, must be under the complete control of its leader.

Experience tells us that once men are placed under a destructive fire, there are but two movements practicable for them—advance or retreat. Taking advantage of the former, or protecting the latter, must be done by other forces held for that purpose. In such advance it is very questionable if any advantage is to be derived from giving to an individual other than the commander of the whole, or to many individuals, the privilege of exercising his or their own opinion as to which of the two they will execute. Blind confidence in the ability of the leader who puts the line into an action to direct its movements has heretofore obtained, and that army whose discipline was most perfect, and hence which could best be relied upon to obey these directions, has usually been most successful in the wars of the past. Will it be so in the future? Battle and battle only can solve the problem.

But battles are not all of war. Strategy has as much to do in deciding the result as battle, oftentimes more. Stratagem has frequently attained more decisive results than many battles. But the strategist must either be a tactician himself, or have a subordinate that is, for he can never attain his objective independently of that art. To handle troops elsewhere than on the field of battle is essential for the purposes of the strategist, for we know that by far the most extensive operations in war are embraced in strategy. In any war that has occurred how little of the time occupied by the campaign is consumed in fighting? Now in all these other exigencies is individualization desirable? Are not promptness and celerity most necessary, and are either promoted by disseminating authority? These contemplated changes are rendered necessary for one phase of war only. The destructive element in the implements of warfare has so increased, that a new method of advance must be adopted to minimize casualties and resultant demoralization. Would it not be well to restrict the changes to this particular phase without involving the entire drill regulations. A change to increase celerity and promptness, to increase the fighting strength of forces, might be desirable; but is the tendency toward individualization in any manner conducive to this? The genius of the commander, assisted by the discipline of his army, I hold to be the chief elements necessary for success in war. Either, by itself, can effect little,—together, in perfection, are difficult to overcome or resist,

and anything that detracts from perfection in either, lessens the chances of victory. History sustains me in these propositions.

Von Scherff, a close critic on the drill of the German Army, says: "A method of instruction which is calculated to seek for results only, in the sum of individual efforts, instead of relying upon an organized division of labor, must and will very soon sink so far below the level of the requirements of war, that it will produce no longer any satisfactory result whatever. It therefore behooves us to say, with concise decision, we require for the new tactics more practice in manœuvring than we have heretofore had; as we can no longer expect the mass of individual soldiers to be equal to all the emergencies of war." And again, in giving the formal requirements of decisive action on a body of troops, he says: "*The power of moving surely and with cohesion in close order* stands first and foremost as point of departure and also as keystone of all action in battle. *The ability to pass quickly from one form of close order to another*, and again to change from close to extended order and *vice versa* come next.

Individual action having become the rule of battle, and tempting, as it does, to carelessness and disorder, by way of counteraction the greatest steadiness, and most perfect order and precision among the masses must be all the more insisted upon and enjoined."

Is the tendency of our modern drill regulations in this direction? Is this tendency toward dispersion salutary? Does not the necessity of control remain the same now as ever? I am asked what the unit should be. I doubt if it ever should be less than the command of an officer. Instances can be cited of non-commissioned officers upon whose judgment, valor and energy every reliance can be placed. But these instances excite wonder and admiration when they would be looked upon as a matter of course in an officer.

In battle it will not do to run risks or to make experiments when certainty and sure results are at hand. Von Scherff says: "Much steady practice is required unless we wish to see, what may easily happen in the heat of such battles as we have now, whole divisions melt away like snow under a March sun, useless because not under the control of the one commander."

I do not wish to be considered a pessimist,—rather would I be an optimist. The new regulations may be favorable toward a reduction of casualties in assault, but will it not be at the expense

of that courage born of emulation and contact existing in the formation? The effect upon an enemy receiving an assault from a line of skirmishers will not be the same as if that line was an overwhelming mass. We seldom hear of a skirmish line carrying a defended position. But even were this a false deduction I hold that no matter what advantages may be gained, if the regulation that produces them interferes with or lessens discipline, its tendency is not salutary. Undisciplined troops will be overcome and entirely lost in the decisive movement. Better lose ten thousand men in a successful assault than one thousand in an unsuccessful one.

THE ORGANIZATION OF MILITIA DEFENSE FOR THE UNITED STATES.

By CAPTAIN JAMES CHESTER, 3D U. S. ARTILLERY.

THE problems of government have claimed the attention of the human intellect ever since men began to multiply on the face of the earth. The first mandate of Omnipotence, "Be fruitful and multiply and replenish the earth, and subdue it," has been obeyed or disregarded by men, according as their solutions of these problems have been true or false.

Government is a growth and not a creation. Beginning from a common germ, governments have differentiated under the influence of their environment, until widely different types have been produced. There may be good governments and bad governments in existence, but they are all popular modifications of the same thing. Every nation grows its own government and gets exactly what its cultivation deserves. The State is merely the nation drawn into a focus. It may be a despotism tempered with assassination, a constitutional monarchy, or a republic; but whatever its form, it is an embodiment of the genius, history, hopes and aspirations of the people. If it is a foreign yoke imposed by conquest, the people who are willing to submit deserve to wear it. They have been tried in the furnace of war and found wanting—wanting in some of the essentials of existence—and the eternal laws of the universe have applied the proper corrective.

War is the great regulator of nations, unpleasant to take perhaps, but essential to health in certain cases. It is not always the fruit of a king's ambition. History and our own experience prove that it is altogether independent of kings. It is a kind of fever with which nations are sometimes afflicted, and it affects the body politic in all its members. But the symptoms appear in a progressive way. As a serious attack they appear in the masses first; the classes slowly yield to the contagion, and finally the king is overwhelmed. And it behaves in a similar way in republics. Universal suffrage is no antidote to the poison which produces the war fever. Kingless nations, where liberty and equality, law and order, right and justice, peace and war, rest entirely

on the people's will, are quite as likely to plunge into war as the veriest despotism. Von Moltke's views, ripened and mellowed by the experiences of a long and eventful life, may be quoted on this point. He says, in his history of the Franco-German War: "Generally speaking it is no longer the ambition of monarchs which endangers peace." "A declaration of war is more easily carried by a large assembly than by a single man." And we should like to add, a free people is always in advance of its government on such subjects. It is easily lashed into fury by the misstatements of an irresponsible press, and not infrequently goes so far that retreat becomes impossible. It is a wise custom which forbids the publication of diplomatic correspondence until the pending question is either settled or confessedly past settlement. A free press is a poor diplomat. Give it an opportunity and the Gordian knot will always be untied in the Alexandrian way. And indeed, in the estimation of perhaps a majority of men, war is the natural way to end a dispute. Neither civilization nor religion has been able to extinguish the old idea, inherited from barbarism, that "*might makes right*." Even the Church has appealed to it, on many occasions, and Christian Europe might be cited to-day as proof that "Peace on Earth" is impossible. Indeed, peace on earth is not the mission of Christianity, for the Master himself says: "Think not that I came to send peace on the earth; I came not to send peace but a sword." (Matt. x. 34.) Whatever the sentimentalist may think or say to the contrary, war is the normal condition of nature. Everything fights. From the microbe to the man the necessities of one demand the death of a multitude, and in the battles which ensue no mercy is shown, no quarter given, no respite asked. In the struggle for existence treachery, cruelty and murder are honest industries. Hunger commands, and death determines the struggle. If we could see it as it really is, the world is a monster battle-field, and every blade of grass and drop of dew are daily drenched with blood.

And this struggle for existence is not confined to natural organisms; nations, governments, and all artificial organizations are participators, in a certain degree. The state is the n^{th} power of the primitive pair from which its people are descended. It has no ambition, no sentiment, no passion which has not been derived from them. It is the focus in which the thoughts of all its citizens are concentrated. If it be warlike the people have made it so; if it be peaceable, thanks to them.

Man is a fighting animal, individually and in the aggregate. Civilization has not been able to altogether eradicate the savage from his nature. And any government which he may institute must partake of that nature. If the man must fight for his existence so must the State. No matter how peaceably inclined it may be, it must fight for its rights or forfeit its existence. If it has nothing to excite cupidity, or if several jealous rivals stand ready to devour it and cannot agree as to their shares, it may be permitted to live until they come to an agreement; but no longer. Indeed, it does not deserve to live.

It is the duty of the State, whatever its form may be, to maintain its own existence. Or, to put it tersely, self-preservation is the first duty of the State. And as the government cannot exist without the nation, the preservation of the nation is included in that duty. No matter how good or how bad the government may be it cannot neglect that duty and live. The despotism and the republic have this one duty in common; they must provide for the nation's defense.

The means of defense, which any government ought to be able to command, are the manhood and wealth of the nation. Over these some governments exercise absolute control. There is no limit to the despot's power in this direction. He may order the last man into line of battle, and confiscate to the State the whole wealth of the nation. It is different in a republic. There the focus is not so closely drawn; the government is not an individual who thinks in secret for the whole nation and acts according to the counsel of his own will; but one or more assemblages of individuals who think aloud and act as a majority may dictate. Unanimity is unattainable in a republic. In statecraft as well as therapeutics, doctors will disagree. Legislators are influenced by public opinion and may make mistakes. The noisiest people are not always the wisest or the most numerous, and the real will of the nation is sometimes difficult to discern. Republican governments are handicapped accordingly. Nevertheless they cannot divest themselves of the first duty of all government. They must provide for defense. If they do not, the eternal laws of the universe have pronounced their doom. They cannot live.

Such thoughts as these lead the mind away back into the mists of antiquity, to the republics which rose serene and beautiful, culminated in a splendor which dazzled the world of their day and then sank to their setting amidst the local storms of fac-

tious ambition, or disappeared in some hurricane of invasion. And we ask, Had they committed that unpardonable sin, which no nation may commit and live?

The Greek republics, in spite of their wealth and culture, in spite of their manly courage and military spirit, and in spite of the eloquence of Demosthenes, went down before the armies of Macedon, because of their internal jealousies and dissensions. They had become too democratic for war. Liberty, as they understood it, was inconsistent with allegiance to any permanent military commander. They had risen to the very summit in art, in literature and in social culture; but they had neglected the art of war. They relied upon the courage of the citizens for the defense of the State and had come to believe that war was only fighting. Subordination, organization, strategy and tactics were words without meaning to them. In short they had acquired erroneous conceptions of war; they had made inadequate preparations for defense; they had disregarded the first law of existence and therefore deserved to live no longer.

The armies of Republican Rome on the other hand, while they unquestionably lost much of the vigor of their early days, were still invincible when the Republic yielded to the Empire. In their best days they were eminently republican. They were in fact a horizontal slice annually cut from the Roman community. All classes of citizens were represented in the army, into which they were incorporated with due regard to their social standing. The magistrate commanded by virtue of his magisterial election. The army was the State militant, and maintained its touch with the people by annual disbandment and reconstruction of its legions. Every citizen had the opportunity to learn the art of war in the school of experience, and every qualified citizen availed himself of the opportunity. The Roman Republic was a nation trained to arms. And so it conquered the world.

But in course of time the annual disbandment and reconstruction of the legions had to be discontinued; new methods of recruitment were introduced; the composition and organization of the legions were changed; the military service of the State became the business of some instead of the duty of all; the legions lost touch with the people. They forgot Rome, and became, to a certain extent, the creatures of their commanders; the luxuries of Rome became more attractive to the classes than the hard-

ships of service against barbarians in remote corners of the earth; factious strife and even civil war made their appearance at Rome and the burden of government became too heavy for the machinery of the Republic. And thus the Empire became a necessity. But it was the government and not the army that failed.

But there is a military system antedating those of the Greek and Roman republics which cannot be overlooked, not only because of its antiquity and excellence, but because of the fountain whence it came. The Hebrews, during the premonarchical period, possessed a military system, ordained by the Mosaic Law, which surpasses in excellence even that of the Roman Republic. The first enrollment under this law was made by Moses in obedience to divine commandment, and included "Every male by their polls, from twenty years old and upward, all that are able to go forth to war" (Numbers i. 3). The Levites alone were exempt from enrollment under this law.

It will be observed that no maximum limit of age is prescribed in the law. We learn, however, from Josephus (Antiq., Book III., Chap. XII., Sec. 4) that the enrollment included "All that were able to go to war, from twenty to fifty years of age." The result of this enrollment showed that at that time, that is while they encamped in the Wilderness of Sinai, the armies of Israel numbered 603,550 men (Numbers i. 46). Josephus gives the result in round numbers as 600,000 men.

The organization of this vast army is worthy of consideration. It will be seen by the account given in the sacred books that the military organization was built upon existing social lines. The whole nation, exclusive of the Levites, consisted of twelve tribes, the two sons of Joseph—Mannasseh and Ephraim—having each founded a separate tribe. The tribal division of the army therefore was a natural one, and as it followed existing lines it could be established with a word.

The armies of Israel therefore may be said to have consisted of twelve armies, separate and distinct from each other. These armies were commanded each by the head of its own tribe. At the first muster or enrollment, the names of these tribal army commanders were announced by divine commandment, and they are declared to have been, "The renowned of the congregation, princes of the tribes of their fathers" (Numbers i. 16).

The subdivisions of these tribal armies seem to have followed family lines. The sacred writer says they were enrolled "By

their generations, after their families, by the house of their fathers, according to the number of their names, by their polls" (Numbers i. 20). The precise meaning of this language is not easily arrived at, but it unquestionably has a family flavor about it which justifies the assumption that the tribal armies were organized upon family lines. There is reason to believe that at a later period the subdivisions of tribal armies were thousands, hundreds, fifties and tens (Numbers xxxi. 14; I Maccabees iii. 55).

Here then we have the military organization of a nation, on tribal and family lines. The commander-in-chief was, *ex-officio*, the head of the nation. The commander of each tribal army was the prince or head of the tribe. Captains of thousands, of hundreds, of fifties and of tens, were heads of generations, houses and families, each according to his standing in society, and the army consisted of every able-bodied man from twenty to fifty years of age.

It is curious to note that at the second great muster of this army, which took place almost forty years later on the plains of Moab, their number amounted to 601,730, or 1820 less than it was at the first muster in the Wilderness of Sinai (Numbers xxvi. 51).

Coming down now to modern times, we find that the Swiss Republic claims for its army every able-bodied male between the ages of 24 and 44 years. The young men who annually arrive at the age of eligibility are carefully sorted by military physicians in the service of the State. The physically unfit are discarded, and the remainder are reported to the proper officers for assignment and training. About 61 per cent. of the 24-year-olds are found qualified for service.

The militia system of Switzerland in its complete form has been in operation since 1874, and has given the State an effective army of 117,000 men, and a Landwehr of 85,000, out of a population of less than 3,000,000 souls.

Turning now to the history of France, we find an assortment of military systems as various as they are instructive. Were we to traverse, or even hastily glance at the whole field, from the tribal organizations which opposed the Romans to the conscription-created armies of to-day, we should be able to cull specimens of every system which has prevailed in the world, except perhaps that of the Hebrews. But we are specially concerned now with republican military systems. We shall therefore restrict our obser-

vations on the French army to the periods covered by the First and Third Republics. The Second Republic had too limited a lease of life to develop anything.

We must not forget, however, that the military ideas of the French people, developed and established under monarchical institutions had taken hold of the French mind so firmly that the First Republic could not see, for some time at least, any necessity for a radical change in the system. It deemed compulsory service inconsistent with the liberty of the citizen. It believed that patriotism would fill the ranks of its armies. And in that, perhaps it was right. The ranks were filled with patriotic volunteers; but it was found impossible to discipline them into efficient soldiers, or even to keep them with the colors.

There is no more patriotic people in existence than the French, and there is no period in French history during which patriotism burned with a fiercer flame than the early years of the First Republic. Yet the experience of France proved beyond a doubt that patriotism alone is a poor foundation to build an efficient army on. The voluntary method of recruitment failed and compulsory service had to be resorted to.

But while compulsory service yielded abundant material, it could not construct an efficient army. The effort at organization on purely theoretical lines, failed in practice. Promotion according to length of service, on the principles of liberty, equality and fraternity resulted in a kind of military anarchy which made successful war impossible. The family ties which strengthened the hands of Captains of Thousands in the armies of Israel, and the civil and social supremacy of officers in a Roman legion, were absent from the republican armies of France. And as most of the experienced officers had been driven from the army on suspicion of royalistic tendencies, there remained no basis of discipline to build upon. The commission of the government, while it conferred the right to command, could not confer the power to control the men in the ranks, and the result was over fifty per cent. of absentees (Encyc. Brit., II. 601).

There is something in this condition of affairs upon which governments, depending on hastily improvised armies for defense, would do well to ponder. Power to control men cannot be conferred by commission. No matter how brave and patriotic men may be they cannot command themselves, nor will they readily submit to the control of a stranger. If there be no tribal or family influ-

ences as in the case of the Hebrews, or social and civil standing as in that of the Romans, some other power must be invoked. And such a power is found in the knowledge that grows out of experience. The officers and men must have time and opportunity to know each other. Few people outside the army have a realizing sense of the importance of this requirement. Certainly the multitude which shouted "On to Richmond" in 1861 had not, any more than the earlier governments of the First French Republic.

But the levy *en masse*, while it filled the ranks for the time being, was unable to keep them full. It was only an expedient and not a system. The drain resulting from active service soon depleted the ranks, and made this apparent, and in 1798 conscription had to be resorted to. So, after trying every plausible experiment, the French Republic was driven to adopt the principles of conscription laid down in the Law of Moses, and under that system the armies of France were maintained throughout the Napoleonic wars.

The collapse of the French military system, in 1870-71, not only indicated that a better system was necessary, but left the new Republic free to build from the foundation up. This it proceeded to do in the way generally followed by military reformers in all ages. It simply copied the latest victorious system. The military system of the Third French Republic is, substantially, the German system. Service is compulsory, with very few exemptions. The citizen is liable to service during twenty years of his life. Of these five are served in the regular army and four in the regular army reserve; five in the territorial army and six in the territorial reserve. The new system went into effect in 1873, and will reach its maximum result in 1893. In that year the whole manhood of the nation, within legal limits, will be trained to arms. The officers of this army are permanent—that is to say, life appointments.

Coming now to the United States of America, we find some difficulty in discovering the presence of any military system at all. There is a standing army, of course, but it has always been a ridiculously small force, and is apparently maintained more as a Federal police force and school for the practical training of officers than as a reasonable defense against foreign aggression. Its ranks are recruited by voluntary enlistment, but its officers are a permanent body—that is, they are appointed for life. The effi-

ciency of the regular army, as it is called, has never been questioned by any one qualified to judge, but its sufficiency is hardly claimed by anybody. The men are carefully chosen, well trained, well disciplined, and well armed, and the officers are appointed from the graduates of the National Military Academy, or from the ranks and civil life, after a more or less searching examination.

The numerical strength of the regular army has varied considerably during the life of the Republic. In 1790 it amounted to 1216 men, and in 1861 in was less than 14,000. In 1870 its enlisted strength was fixed at 30,000, but 25,000 only have been provided for in the appropriation acts since 1879.

As already said, the regular army is a well appointed, well officered, and thoroughly efficient force, but its numbers are so ridiculously small as to indicate unmistakably that the nation does not depend on it alone for defense. Turning to the statute book for enlightment on the subject, we find: "An Act more effectually to provide for the national defense, by establishing an uniform militia throughout the United States," approved May 8th, 1892. This act remains in force to-day, except that one word (white) has been stricken out by an amendatory act, approved March 2d, 1867. The act provides: "That each and every free, able-bodied (white) male citizen of the respective states, resident therein, who is or shall be of the age of eighteen years, and under the age of forty-five years," shall be enrolled in the militia.

Here, then, we have the real provision for national defense. That the law is practically obsolete is made apparent by merely reading it. That it was always so is proved by history. In 1812 the United States declared war against Great Britain. In 1814, so inadequate were the nation's means of defense that a force of only 3500 men were able to land from a British fleet then in the Chesapeake, and to march almost unopposed to the capital of the nation, and there burn or destroy all the public buildings and records. The Mexican war, not being defensive in its nature, hardly comes within the province of the militia, but in 1861 the national existence was actually in danger. If there ever was a moment when efficient means of national defense were needed, it was in 1861. But the legal provisions for the performance of that important duty were so conspicuously obsolete and inadequate that the President disregarded them entirely and called for

75,000 volunteers. Subsequently, that is in May, 1861, a further call was made for 42,000; in July, 1861, for 500,000; and, again, in the same month, for 500,000 more; and, finally, the government was forced to resort to conscription.

Under the conscription in October, 1863, a levy of 300,000 was called for; and another in February, 1864, of 500,000. In 1865 two more levies were ordered, but the collapse of the Rebellion rendered the whole of the last levy unnecessary.

These two chapters from our National history clearly prove that the legal means provided for our national defense are altogether inadequate or non-existent; that the volunteer system, stimulated as it was by the patriotism of the people and enormous bounties, yielded good material for a time, but proved unequal to the strain of a four years' struggle, and that finally conscription had to be resorted to.

There is much food for reflection in that short statement of facts. In 1814 the Nation had a warning that it had been neglecting the first law of existence. In 1861 the warning was repeated in thunder tones. And now, when thirty years have elapsed since the last warning, and the question is asked: To what extent have these warnings been heeded? We are dumb. We can show nothing but the old militia law of 1792, amended by striking out the word "*white*." Does such a Nation deserve to live? Answer it ye in whom the Nation has placed its trust. Answer it by action. There may be no more warnings. The decree may go forth at any moment: "Cut it down. Why cumbereth it the ground?"

We are not blind to the peculiar position of the United States among the nations of the earth. Their people occupy a continent almost entirely to themselves. They have no powerful neighbors, and as yet no entangling alliances. It might be argued that their position makes them independent of the universal law. But they are nearer Europe than they were fifty years ago. Steam and electricity have brought the world to their doors. Their isolation is no longer a defense. They have seen hostile European troops on the territory of a neighbor not many years ago. A combination of nations in such a situation is not impossible, and such a combination might have unpleasant consequences. They would not be frightened off by sixty millions of people merely making faces at them. They must be driven off.

But why should they come? Because they are overcrowded

at home. Because there is a continent here unsurpassed in its resources and teeming with wealth. Because they have a right to come. All nations hold their wealth, nay their existence, upon the same tenure. While they can defend it, it is theirs, but no longer, and any nation or combination of nations may raise the question of ability at any time.

We conclude, therefore, that no nation is safe until it has solved the problem of defense in a satisfactory manner, and that, as every nation has a temper of its own, every nation must solve the problem for itself. There is no special solution for republics that would apply equally well to all. In what follows we have had the United States of America specially in view.

The growth of the United States in wealth and population since the passage of its only militia law has been altogether phenomenal. If the military manhood of the nation were called out to-day in accordance with the provisions of that law the result would be a multitude compared to which the armies of Xerxes would sink into insignificance. Such an army could not be economically used. Indeed, no possible enemy could bring an army against us which would call for such a multitude of defenders. We do not stop to prove this by calculation. We think it unnecessary to do so. If Switzerland, out of a population of less than three millions, can put in a line of battle for defense 202,000 men, it would be a waste of time to go into any calculation to show that the nation numbering over sixty-two millions has more men for military service than it can ever possibly need.

This superabundance of material should induce the Government to contract the age limits of militia service. They should be contracted until they yield a sufficient number of men and no more, and then the law should be rigidly enforced. The principle, which ought to govern in every republic, should never be departed from, namely—every citizen, physically fit, must serve the State in some military capacity during certain years of his life.

The limits of age for militia service then should be so regulated as to yield the number of men required. In small nations they will be large, in large nations small by comparison. The Hebrew limit was 20 to 50; the Swiss 24 to 44; the American 18 to 45 under the obsolete act of 1792.

It would be difficult to determine with even approximate accuracy the number of men required for national defense. The

number that any possible enemy could bring against us would be the correct basis of an estimate, but that number is an unknown quantity. Should an enemy come directly against us, the number of troops which could be transported across the ocean, with the impedimenta essential to active service would be very small. An army corps of 30,000 men, fully equipped for the field, would tax the maritime transportation of most nations, if they had to be transported at a single trip. If, however, they could utilize the territory of a neighboring nation, and could accumulate material there in advance, perhaps double that number might be transported. But such preparations would always be detected and countered in some way in advance. No nation can be surprised in that way, in these days of telegraphs and rapid transit. A sudden invasion must come like a bolt from the blue, having been organized in secret on the other side. And such an expedition, could not, in our estimation, exceed 30,000 men. Our national defense is not provided for until arrangments are made to meet snch an expedition at any point on our coasts where it may choose to land.

But such an expedition would only be the first wave of invasion. Similar waves would follow, if the first one was successful, and the military manhood of the nation might be required to expel them. Let us assume then, tentatively, that the age limits for militia service are fixed at 21 and 33 years. What force would thus be placed at the Government's disposal?

It would be unwise to base calculations of this nature upon population. There are aliens in the country, and the majority of them, perhaps, are within the militia age limits. A better basis may be found in the vote cast for President. We do not assume that the number of votes accurately represents the number of citizens, but the error, whatever it may be, is on the safe side. The vote for President is sufficiently accurate for our present purpose. It gives us, approximately, the number of males over twenty-one years of age.

The next step is to determine the number of these citizens within the militia age limits; that is, between 21 and 33 years. We have not the data to determine this with accuracy, and must be satisfied with an approximation, provided, always, that the possible error is on the safe side. Von Scheel, in his "Hand-Buch der Statistik" gives 214 as the number between 21 and 33 years of age in every thousand of population. It must therefore

be much below the ratio when applied to voters. We are thus assured that the error, which is undoubted, is on the safe side, and that any calculation on the basis of 214 per thousand will be under the truth.

There is still another correction to be made, however, before the real military manhood between the assumed age limits can be ascertained. The question, How many are physically fit? must be answered. On this point we find that Switzerland inspects annually the young men of 24 years of age, and finds, on an average, 61 per cent. of them physically qualified for military service. If American citizens between the ages of 21 and 33 years are as healthy and well developed as Swiss young men of 24—which hardly admits of a doubt—we can take another step forward in our calculations. But in order to be on the safe side in this part of our calculations also, we shall assume that 60 per cent. only of American citizens between the ages above specified are physically fit for military service.

We are now prepared to calculate. Taking from the *Tribune* Almanac the number of voters in each State at the last Presidential election, we take 21.4 per cent. of them as the number between 21 and 33 years of age. We then take 60 per cent. of the number thus found and the result is the military manhood of the States, the aggregate of which gives the military manhood of the nation. (See table on next page.)

Thus we get a militia force of 1,558,374 men. It is not pretended that the number is correct. All we claim for it is, that it is the absolute minimum which would be obtained by the enrollment of every able bodied citizen between the ages of 21 and 33, and that our table shows the ratio of their distribution among the several States. The greatest fault of our present militia law —if we omit its obsolete clauses—is that it yields too many men. Mllitia service is a tax levied upon citizens, and it should be no heavier than the necessities of the State require. If, upon enrollment, the number of men is found to be excessive, the limits of age should be contracted.

But age is not the true basis of enrollment. We have adopted it tentatively, as a basis for our calculations, and because it is in the law; but fairness demands some other foundation in this country. Aliens, who become citizens at or after thirty-three years of age, should not be entirely exempt from the blood tax. The law should declare that every able-bodied citizen owes twelve

STATES.	VOTERS FOR PRESIDENT, 1888.	MILITARY MANHOOD.	REMARKS.
Alabama	200,713	25,716	
Arkansas	155,941	20,075	
California	251,339	32,272	
Colorado	91,653	11,828	
Connecticut	153,978	19,771	
Delaware	29,787	3,825	
Florida	66,635	8,556	
Georgia	142,939	18,353	
Idaho	18 126	2,327	
Illinois	747,833	96,022	
Indiana	536,890	68,937	
Iowa	404,130	51,890	
Kansas	334,035	42,890	
Kentucky	344,781	42,986	
Louisiana	115,978	14,891	
Maine	144,087	18,501	
Maryland	210,921	27,082	
Massachusetts	344,448	42,943	
Michigan	476,273	60,153	
Minnesota	263,285	33,706	
Mississippi	600,000	77,040	Estimated.
Missouri	521,336	66,939	
Montana	38,204	4,915	
Nebraska	202,653	26,020	
Nevada	12,771	1,639	
New Hampshire	90,819	11,660	
New Jersey	303,741	39,000	
New York	1,324,510	170,067	
North Carolina	285,572	36,667	
North Dakota	38,083	4,890	
Ohio	840,379	103,905	
Oregon	73,295	9,411	
Pennsylvania	997,568	128,088	
Rhode Island	45,457	5,837	
South Carolina	92,860	11,923	
South Dakota	77,827	9,993	
Tennessee	303,784	39,006	
Texas	357,371	45,886	
Vermont	63,475	8,150	
Virginia	304,093	38,945	
Washington	58,443	7,502	
West Virginia	158,309	20,327	
Wisconsin	354,584	45,528	
Wyoming	18,008	2,312	
	12,196,914	1,558,374	

years militia service to the nation; that he should be enrolled when he casts his first ballot for President of the United States; that his service should begin on the fourth of March next succeeding; and that he should serve four years in the regular

militia, four years in the first militia reserve, and four years in the second militia reserve; after which he should be exempt.

Such an arrangement would enable us to use much of our political machinery for militia purposes, and make the enrollment at least a very simple matter. Indeed, the election officers might be required by law to make a list of the names of citizens casting their first ballot, and transmit the same to the enrolling officer. Claims for exemption on account of disability should be filed with the enrolling officer on or before some fixed date, and the physical examination should follow on some convenient day, so that all questions of exemption might be settled before the fourth day of March next succeeding. On March 4th—the commencement of every Presidential term—the enrolled men would report in person to the proper officer for organization.

Assuming that such a law was in existence, the President of the United States would be able to call out a militia force of at least 516,000 at any moment, and might follow it up by two more calls for a similar number, and the men would be ready to mobilize next morning.

In military affairs the element of time has immense importance. Ability to mobilize a few hours earlier than an adversary may mean not only the initiative in the first campaign, but the advantage throughout the war. If the President can summon 500,000 men by telegraph to the defense of the State this evening, and be sure that they will all be at their rendezvous and ready to march next morning, mobilization would be shortened immensely, and corresponding advantages would be secured. In proposing a scheme for the organization of a national militia then, the question of rapid mobilization should be kept constantly in view.

It is a fact which will be admitted by experienced military men, that green troops need more and better officers than veterans. In the higher commands especially, experience is essential to efficiency. It would be unwise, therefore, to carry the organization of the national militia beyond the battalion, although it may be necessary to group contiguous battalions in time of peace, for administrative purposes and to facilitate mobilization.

As a handy number to deal with, and also because it is not beyond the limits of control by one man, one hundred may be taken as the most convenient number of men for a militia company. The platoon would then consist of fifty men, and the

squad of ten. So the militia company should consist of one captain, one first lieutenant, one second lieutenant, one first sergeant, five sergeants, five corporals, two musicians and eighty-seven privates; making in all three commissioned officers and one hundred enlisted men.

Experience would soon determine how many polling precincts should be combined in order to yield 160 men casting their first ballot for President. No doubt political managers would be able to tell in advance with close approximation to accuracy. But absolute accuracy is not essential to the scheme. Military companies are rarely full, and even if they were over full their efficiency need not be affected in consequence. The proper number of precincts, then, would be united and called a "Militia District," and as this is purely national work, the grouping should be done in the office of the United States Marshal. When the "Militia Districts" for any State are reported to the national government, the President would cause a copy of the report to be sent to the governor with a request for the appointment of majors to command them.

The commandant of a national "Militia District," while appointed by the State according to the requirements of the United States Constitution, would nevertheless report to, and receive orders from the War Department of the United States. He is the connecting link in time of peace between the national government and the national militia of his district. But he has other important functions. He is the enrolling officer of his district, the commandant of its national militia battalion, and mustering officer for the United States.

When he receives from the election managers of each polling precinct the names of such citizens as had then cast their first ballot for President, and the claims for exemption from such as consider themselves disqualified to serve, he would notify claimants by public advertisement, to appear at some specified time and place for physical examination. When the disability claims were all properly acted on, he would then make out and publish the enrollment list, and call a meeting of the men at some suitable time and place for the election of officers under the laws of the State. The result of this election would be forwarded by him to the Governor of the State, and the officers elect would be commissioned in due course. And all this should occur before the 4th day of March next ensuing.

On the 4th day of March—inauguration day—the major commanding the Militia District musters the new company into the national militia and sends a copy of the muster-in roll to the Adjutant-General of the Army, and also to the Governor of the State. At the same time he musters out the company which had completed its twelve years' service, and witnesses the transfer of arms, accoutrements, equipments and all public property in its possession to the new company just mustered in. Copies of the muster-out roll are also sent to the Adjutant-General of the Army and the Governor of the State.

The major commanding a Militia District would also command the battalion of three companies belonging to that district, and be responsible for its efficiency.

Militia Districts should be united in groups of four, for purposes of instruction and to facilitate mobilization when called into active service. These groups would be the equivalent of regiments of twelve companies each, but as they are not intended to serve together in the field it would be unwise to give them a regimental organization or even a distinctive name. But they should have a commander, duly elected and commissioned under the laws of the State, as a lieutenant-colonel, who should be allowed two extra lieutenants as adjutant and quartermaster of the group. The group commander selects some convenient point as a rendezvous for the battalions, when they are assembled for drill purposes or mobilization.

Should the President at any time call out the first line of the national militia, the youngest company of each battalion would march forthwith to the group rendezvous and report in heavy marching order to the lieutenant-colonel. When the four companies had assembled the lieutenant-colonel would march the battalion thus formed to such point as may have been designated by the proper United States officer for mobilization, and the remaining companies would elect a new group commander, and hold themselves in readiness to send forward a second and a third battalion when called upon to do so.

The national militia would thus arrive at the points designated for mobilization as organized battalions and might be organized into regiments, brigades, divisions, corps and armies, as the United States authorities might direct.

If regimental organization were resorted to, a regiment would consist of three battalions, not neccessarily all from the same

State, and would be known as the —nth Regiment of United States Militia. The colonel and staff officers of United States Militia Regiments, and the generals and staff officers of all higher organizations would be appointed by the President of the United States in the usual way.

There would be no great difficulty experienced in establishing and maintaining such a militia system, by utilizing existing political machinery. For example, the County of Albany, New York, according to the basis upon which our calculations have been made, would furnish 5239 men for the militia—say 52 companies, and as there are three companies to a militia district, there would be say 18 militia districts in the county. The county of New York would furnish 26,447 men, or 264 companies. There would therefore be 88 militia districts in the county of New York. And so on.

Let us now take a case in some less populous State. Take Kent County, Delaware. It would furnish 880 men—say 9 companies, in 3 militia districts. Pasco County, Florida, 90 men—say one company—would have to be united with a neighboring county so as to constitute a militia district.

As already said, we are absolutely certain that all our calculations are under the truth, perhaps a great deal under. The first enrollment would disclose the real truth. If it yielded more men than the Government could possibly need, then the term of service should be shortened. The blood tax should be kept as light as the safety of the nation will permit. Perhaps an eight, or even a four years' term would yield sufficient men. But whatever it might be, it should always be commensurate with the presidential term. The militia system should be united to the political system as closely as possible. Those mustered in at the inauguration of a President should be designated by that President's name —thus: "Harrison's Line of the National Militia." And they should retain that designation until they are mustered out. Should the President be elected for a second term, the new line would be known as "Harrison's Second Line." There is something more than sentiment in such designations. They would enable the President to call out over half a million of men with a single word, without advertising the number to the enemy.

Whatever the numerical strength of the national militia might be, they should all be armed and equipped by the national government, and furnished with one suit of fatigue uniform. There is no use in wincing at the expense. The wealth, as well

as the manhood of the nation, are its means of defense, and both must be forthcoming in sufficient quantities if the nation would live. As soon therefore as the enrollment of a new line of militia is completed, requisition should be made by commandants of militia districts for the necessary outfit. Arms and equipments will be obtained from the line being mustered out. The new line should be armed and equipped on inauguration day, when it is mustered in.

The national militia are separate and distinct from any volunteer militia, which, with the consent of Congress, any State may maintain, although men may belong to both organizations at the same time. Every citizen owes a double allegiance, and may be properly required to do double duty. But the claims of the nation are supreme. His service to the State must never be permitted to interfere with his service to the nation.

We say then, in conclusion, that the defense of the nation demands:—

1. A regular army, always ready, and sufficiently strong to ward off the first wave of invasion.

2. Three lines of national militia, organized, armed and equipped as above described, and always ready for mobilization and concentration at the call of the President.

But the national defense also demands a higher organization than we have yet described. We must not forget that a multitude of men, with muskets, even when organized into battalions, does not constitute an army. It is only the material out of which an army may be made. The organization must be carried further. It is the higher organization that makes numbers effective.

The higher organization of the national militia is a military problem of the first order. It includes problems of rapid concentration, strategy and supply. The mobilization of battalions has already been provided for. When the first line is called out by the President, the four companies of that line belonging to any group of militia districts assemble at the group rendezvous, and report to the lieutenant-colonel for service. So far everything is provided for. But concentration into regiments must also be provided for. The simplest, but not necessarily the wisest way to do this, would be to select a regimental rendezvous at some central point, and there establish regimental headquarters. If the rapid concentration of the battalions of the

regiment were the only thing aimed at this might be the best way of doing it. But there are other considerations which demand attention. There should be no countermarching in the concentration. Battalions should always gravitate along the natural lines of communication towards the theatre of anticipated operations. The selection of a regimental rendezvous involves strategical considerations and questions of logistics which can be solved understandingly only by the General-in-chief. The selection of regimental headquarters for regiments of national militia then, should be made by the General-in-chief.

The appointment of colonels is another question of prime importance. It has already been said, and will be universally admitted, that green troops need abler commanders than veterans, or troops accustomed to daily discipline, although they may have never been under fire. It is important, then, that the field from which selections can be made should be as wide as possible. Regiments of national militia come into existence only when militia battalions are called into the service of the United States. The President of the United States, therefore, should appoint the colonels, and his selection should not be restricted by state lines. The regiment is National, not State.

The regimental staff should be nominated by the colonels, and appointed by the President in the usual way.

A regiment of national militia should consist of one colonel, one adjutant, one quartermaster, one commissary, and three battalions of troops.

A brigade should consist of the brigadier-general and his two aides-de-camp, an assistant adjutant-general, an assistant quartermaster, an assistant commissary, a brigade surgeon, and three regiments of troops.

The brigadier-general and his aides should be appointed in the same way as the colonels and regimental staff, but the heads of administrative departments should be assigned.

The headquarters of a brigade should be designated by the General-in-chief, as in the case of regiments, and for similar reasons.

The Division should consist of a major-general, three aides, an assistant adjutant-general, a quartermaster, a commissary of subsistence, a division surgeon, an ordnance officer, and three brigades of infantry.

The major-general and his aides should be appointed as in the

case of brigadier-generals, and the heads of administrative departments should be assigned in the usual way. Headquarters should be designated as in the case of brigades.

The Corps should consist of a lieutenant-general and four aides, an assistant adjutant-general, a deputy quartermaster-general, a deputy commissary-general of subsistence, a medical director, an ordnance officer, a commandant of artillery, three divisions of infantry, two battalions of artillery, and one regiment of cavalry.

The lieutenant-general and his aides should be appointed, and the heads of administrative departments should be assigned, as in the case of divisions.

Headquarters should be designated by the General-in-chief.

Confining our attention to infantry, for we have not yet taken artillery or cavalry into consideration, let us see what our proposed organization would give us in the way of numbers.

We have:—

The Company,	consisting	of	3	commissioned officers and	100	men.
The Battalion,	"		15	" "	400	"
The Regiment,	"		49	" "	1,200	"
The Brigade,	"		154	" "	3,600	"
The Division,	"		471	" "	10,800	"
The Corps (*a*),	"		1,423	" "	32,400	"

(*a*) Not including the two battalions of artillery and one regiment of cavalry.

Assuming now that our calculations of the military manhood of the nation within militia limits is approximately correct—we know that it is under the truth—the first line of the national militia would number 519,457. Remembering, also, that the strength of an army corps, according to our proposed organization, is 32,400 infantry, the first militia line might be divided into sixteen army corps. These might be distributed as follows:—

Beginning at the west end of our northern frontier, the first corps might have special charge of that frontier from the Pacific to Lake Superior. The corps would consist of the first line of militia in

Washington	2,500
Oregon	3,137
Idaho	775
Montana	1,638
North Dakota	1,630

South Dakota	3,331
Nebraska	8,673
Wyoming	776
Minnesota	11,235
	34,426

A little over full, according to our standard. The headquarters of this corps, as also of its divisions, brigades and regiments would be selected by the General-in-chief, with due regard to rapid concentration on any possible line of invasion across that part of the frontier committed to its care.

The Second Corps would guard the line of invasion across the Sault Ste. Marie, and would be composed of the first line of militia from Wisconsin and Iowa:—

Wisconsin	15,176
Iowa	17,296
	32,472

The Third Corps would guard the line of invasion by way of Detroit, and would consist of the first line from:—

Michigan	20,051
Indiana	22,979
	43,030

This corps has a very important position to defend, and therefore has an extra division attached to it.

The Fourth Corps would consist entirely of Ohio troops, and as no probable line of invasion enters its territory, it should be held in readiness to reinforce the Michigan or Western New York corps, as occasion might demand. It would consist of the first line from:—

Ohio ..... 34,635—a strong corps.

The Fifth Corps would also be a supporting corps, and would consist of Illinois troops, thus:—

Illinois 32,007

The Sixth Corps would support the Seventh, and would consist of troops from Western Pennsylvania:—

Western Pennsylvania 32,400

The Seventh Corps has an important part of the frontier to defend, and would be supported by the Fourth and Sixth, and, if deemed necessary, by the Eighth and Ninth. It would consist of troops from:—

Western New York 32,400

The Eighth Corps has an extensive frontier to watch, and one important line of invasion to defend, in which duty it might be assisted, if deemed necessary, by the Seventh, Ninth and Tenth Corps. It consists of troops from: —

New Hampshire	3,886
Vermont	2,716
Maine	6,167
Massachusutts	14,314
Connecticut	6,540
	33,673

The Ninth Corps, assisted by the Tenth, would furnish the covering army for the defenses of New York Harbor, should they be assailed. It would consist of troops from:—

Eastern New York	24,289
Rhode Island	1,945
	26,234

A weak corps, but sufficient, it is believed, for the special duty assigned to it—that is, to repel any landing party which might attempt an assault upon any of the batteries. In case of a serious attack by an army, the Fourth, Fifth, Sixth and Eleventh Corps, in addition to the Tenth, could be called upon for assistance.

The Tenth Corps is the guardian of Philadelphia and the Delaware, Jersey and Maryland coasts. Its natural supports are the Eleventh and Fifteenth Corps. It consists of troops from:—

Eastern Pennsylvania	10,296
New Jersey	13,000
Delaware	1,275
Maryland	9,027
	33,598

The Eleventh Corps has special charge of the coasts of Virginia and North Carolina. It supports the Fourth and Fifteenth Corps. It consists of troops from:—

Virginia	12,981
West Virginia	6,776
North Carolina	12,222
	31,979

The Twelfth Corps is the special guardian of the coast line from North Carolina to Texas. It consists of troops from :—

South Carolina	3,974
Georgia	6,117
Florida	2,852
Alabama	8,572
Louisiana	4,963
	26,478

A weak corps, but would, no doubt, be much stronger if the full vote was brought out. The natural supports of this corps are the Fourteenth and Fifteenth.

The Thirteenth Corps defends the Mexican frontier, and the coast of Texas and California. It consists of troops from :—

Texas	15,295
California	10,757
Colorado	3,942
Nevada	546
New Mexico, Arizona and Utah	Unknown
	30,540

But would no doubt reach 32,000 if the territorial troops were included.

The Fourteenth Corps is a supporting corps, and consists of troops from :—

Mississippi	25,680
Arkansas	6,691
	32,371

The Fifteenth Corps is also a supporting corps, consisting of troops from :—

Tennessee	13,002
Kentucky	14,328
	27,330

The Sixteenth Corps is also supporting. It consists of troops from :—

Missouri	22,313
Kansas	14,296
	36,609

We now turn to the artillery. Good artillery is indispensable in any army composed of green troops, and good artillery requires special training. The ordinary methods of militia training can never produce efficient batteries. Conscripted batteries, therefore,

are impossible. Still the number of batteries in the regular establishment, even if increased to seven regiments, as proposed is so small that supplementary batteries must be found in some way.

We propose, therefore, that volunteer militia batteries should be raised. Capable men, who have a taste for artillery service, and are willing to devote a certain amount of time to it annually, should be encouraged to organize themselves into volunteer militia batteries, until the requisite number of batteries are obtained. As an inducement to enter this branch of the service, volunteer artillery militia should be required to serve only eight years, but during all that time they should belong to the first line—that is they should answer all calls for service during the eight years. Their terms of service should be so regulated at the commencement, that half the batteries would be mustered out at the end of every period of four years.

Artillery material—guns, harness, ammunition, etc.,—should be assembled in artillery parks in sufficient quantity to equip the requisite number of batteries. These parks should be established at points selected by the General-in-chief, and garrisoned by such number of regular batteries as may be needed to properly care for the material, and furnish instructors for the volunteer militia batteries assigned to the park for that purpose.

The regular batteries garrisoning artillery parks should be mounted and equipped as horse batteries.

Volunteer militia batteries assigned to any artillery park should be required to attend a course of drill and instruction at that park annually; the course to cover a period of at least two weeks.

During the period set apart for volunteer instruction, the officers, men and material of the regular batteries would be utilized for instruction purposes; that is, the regular captains would take command of the officers and men of the volunteer batteries, and, setting the regular soldiers aside for the time being, use the volunteers exclusively to man their batteries at drill, and for stable, and all other duties required of regular troops.

A volunteer militia battery should consist of 1 captain, 2 first lieutenants, 1 second lieutenant, 1 first sergeant, 1 quartermaster sergeant, 6 sergeants, 6 corporals, 2 buglers, 4 artificers and 60 privates.

Horses suitable for artillery purposes in the neighborhood of

artillery parks should be registered every four years; that is, as many of them as would be required for the unhorsed batteries stored at the park. An equitable bonus should be paid to the owners on the acceptance and registration of such horses by the United States. Such registration should give the United States the option of purchasing these horses at a fair valuation any time within the next four years, the owners giving bonds to produce the horses at the artillery park when called upon to do so during that period.

The artillery park should contain the requisite number of batteries, completely furnished with everything necessary for field service except horses and men. This material should be stored in separate storerooms, one battery in each storeroom, and the regular artillery garrison should be sufficiently strong to take care of it as well as their own batteries.

Every army corps of the strength prescribed in the foregoing organization should have at least eight batteries of artillery. The number of batteries required to equip sixteen corps, therefore, would be 128. But it is not absolutely necessary, perhaps, that supporting corps should be fully equipped with artillery. A reserve park at some central point might make it possible to dispense with the artillery contingent in supporting corps.

To give an idea of the amount and distribution of field artillery absolutely needed, it will be well, perhaps, to enter somewhat into details, and show where the batteries ought to be and what they are needed for.

We say then that there should be a large artillery park at or near Schenectady, New York, at which all the artillery material for the 7th, 8th and 9th Corps should be assembled. In other words there should be 24 field batteries complete, 21 of which would be in store, and three in the hands of the batteries which constitute the regular garrison of the park. These, as already said, should be mounted as horse batteries. There should, of course, be ample provision in the vicinity of the park for drill and artillery practice.

The volunteer batteries would arrive for their annual drills and training, three at a time, and would be taken charge of and instructed as already described. Giving them two weeks' instruction, which is, we think, the minimum possible to be effective, would take up 14 weeks of the season, leaving at least 12 weeks

of good weather for the instruction and training of the regular garrison.

The second artillery park should be established at or near Washington, D. C. It would contain the artillery material of the 10th and 11th Corps; that is 16 field batteries, two of which should be in the hands of the regular garrison mounted as horse batteries. The routine of instruction would be similar to that at the first park, except that only two volunteer batteries would be undergoing instruction at the same time.

The third artillery park should be at or near Atlanta, Ga., where 8 batteries should be assembled, one being horsed and manned by the regular garrison. This is the artillery of the Twelfth Corps.

The fourth artillery park should be at or near San Antonio, Texas, where 4 batteries should be assembled, 3 of which would be in store, and 1 in the hands of the garrison as a horse battery. This is half the artillery of the Thirteenth Corps.

The fifth artillery park at or near San Francisco, Cal., contains 3 batteries in store and one in possession of the regular garrison. This is the other half of the artillery of the Thirteenth Corps.

The sixth artillery park at or near Vancouver Barracks, Oregon, contains 3 batteries in store and one in possession of the regular garrison, mounted as a horse battery. This is half the artillery of the First Corps.

The seventh artillery park at or near St. Paul, Minn., with 3 batteries in store and one mounted as a horse battery and manned by the regular garrison. This is the other half of the artillery of the First Corps.

The eighth artillery park, at or near Chicago, contains 14 batteries in store and two batteries horsed and manned by the regular garrison. This is the artillery of the Second and Third Corps.

The Reserve Artillery park should be established somewhere in Kentucky and should contain 14 batteries in store and 2 in the hands of the regular garrison.

To recapitulate, we have at:

Schenectady, N. Y.....	3	Regular	Batteries,	horsed,	and	21 in store.
Washington, D. C.....	2	"	"	"	"	14 in store.
Atlanta, Ga.....	1	"	"	"	"	7 in store.
San Antonio, Texas...	1	"	"	"	"	3 in store.

San Francisco, Cal....	1	Regular	Batteries,	horsed,	and	3 in store.
Vancouver Barracks, Or	1	"	"	"	"	3 in store.
St. Paul, Minn.....	1	"	"	"	"	3 in store.
Chicago, Ills.....	2	"	"	"	"	14 in store.
Reserve in Kentucky..	2	"	"	"	"	14 in store.

Making in all.....14 regular batteries horsed, and....82 volunteer batteries and in store.

Cavalry should also be obtained on the voluntary principle. Young men with a taste for mounted service, and who own and are willing to register an acceptable cavalry horse, should be encouraged to volunteer for the cavalry service. As an inducement, the term of service of a cavalry volunteer who owns and registers for service an acceptable cavalry horse, should be only four years. We have no doubt that sufficient mounted men would be obtained in this way, not only to furnish the regiment of cavalry—12 troops—to each corps, but also to construct an independent cavalry corps of 25,000 sabres.

But the organization of an army is incomplete until its transport service is provided for. In considering this department of army organization we shall confine our calculations to the necessary transportation for one corps. The results reached, with slight modifications depending upon numbers alone, may be applied to any corps or division of the army.

Tentage is not included in our calculations. Modern armies, during active operations, must move without tents.

Corps headquarters require 6 army wagons for baggage, records, and mess-furniture; division headquarters, 3; brigade headquarters, 2 and regimental headquarters, 1.

The corps trains consist of the artillery ammunition train, and the supply train.

Every wagon is supposed to carry five days' forage for its own animals in addition to its load. Wagons should never be overloaded; 2550 lbs. is ample load for an army wagon.

The corps artillery consists of 48 guns. They carry 168 rounds of ammunition per gun, and should have in reserve at least 100 rounds. The average weight of one round, including shot, powder and packing-box, is 19 lbs. The weight to be transported then would be 4800 x 19—91,200 lbs., which would require 36 wagons.

The corps supply train carries forage for headquarter horses and the regiment of cavalry attached. There would be about 25

of the former and 1281 of the latter to be fed. The usual field ration is 10 lbs. of oats. The weight to be carried then would be 13,060 lbs., and for five days 65,300 lbs.—ample load for 25 wagons.

The cavalry regiment would draw its subsistence from one of the division commissaries.

The division trains are an ammunition (small-arm) train; 2 supply trains, and the headquarter and baggage train.

The small-arm ammunition train should carry 100 rounds per man, which would be for the infantry 1,080,000 rounds, and for the cavalry 120,000 rounds. Putting these together, we have 1,200,000 rounds to be carried. Now a box of small arm ammunition will average 86 lbs. gross. The weight to be carried therefore, is 103,200 lbs.,—a good load for 40 wagons. The cavalry ammunition fills four of these wagons.

The two division supply trains carry five days' rations for the division. The number of men to be fed, including 1200 cavalry, is 12,000, and 100 rations weigh 393.75 lbs. gross. The weight to be carried then, for one day, is 47,250 lbs., and for five days 236,250 lbs., a load for 92 army wagons, or two trains of 46 wagons each. Nine of these wagons carry supplies for the cavalry regiment.

For baggage, records, etc., 3 wagons are allowed the division headquarters, 6 to brigade, 9 to regimental, and 27 to battalion, making in all a train of 45 wagons.

To recapitulate, we have:

Corps headquarter train	6 wagons.
" Artillery ammunition train	36 wagons.
" Supply train	25 wagons.
1st Division ammunition train	40 wagons.
1st Division supply train, 1st section	46 wagons.
1st Division supply train, 2d section	46 wagons.
1st Division baggage train	45 wagons.
2d Division trains	152 wagons.
3d Division trains	152 wagons.
Total for the Corps	548 wagons.

All of which are absolutely necessary before the corps can take the field. The wagons and harness therefore, should be kept in store, preferably at the artillery park where they could be taken care of, and options for the requisite number of draught horses or mules should be secured as in the case of the artillery.

The ambulance service should also be organized in advance if the army is to take the field properly equipped, but to an army intended to operate only in its own country it is not so indispensable. Perhaps a general requirement that every regiment should be provided with one ambulance, and every battalion with four stretchers, would be sufficient.

We have now completed our scheme of organization. It is vast in its proportions, but simple enough for any one to understand. It adapts itself readily to our political system and machinery, satisfies the requirements of frontier defense, and, though last not least, it is a workable scheme.

THE VALUE OF MANŒUVRES AND KRIEGS-SPIEL.

By LIEUT. C. H. BARTH, 12TH U. S. INFANTRY.

MANŒUVRES.

THE term "manœuvres" is sometimes restricted to mean the evolutions of larger bodies of troops over diversified ground—the troops simulating the different modes and stages of attack and defense. According to one authority * they should be divided into two classes: First, "Those which may be considered purely tactical, or in which the training of men to use their arms and accustoming them to the orderly and rapid movements required in an engagement are the points chiefly desired." In these, then, the training of the men is the primary object. Second, "those having a general reference to the ground, according to a preconcerted 'general idea' and to sham fights." In this case the force would be manœuvred against an imaginary opponent represented by flags or by skeleton organizations; or it would be divided into two parts, and then these would be opposed to each other. In this class of manœuvres the education of the leaders is the main object desired; therefore it is always best to divide the force and oppose the parts to each other. In this way the situations resulting will be more nearly in consonance with what would be the case in war. For example: If a force supposed to be a battalion in the manœuvre is actually of this strength, it will take the same time to move from one given point to another that it would in a campaign. But if this battalion is represented by a few men only, these will be apt to move more rapidly over the ground than the battalion could and will thus assist in producing unnatural combinations and results. The leaders also will be more likely to act as they would under similar circumstances in war, if the forces seen are considered to be just what they are.

Captain Wilkinson says that "the best possible training for officers short of actual war would be a perpetual course of manœuvres with complete armies or army corps. In other words, the best practice for an officer next to a fight is a sham fight. †

* Von Schellendorf's "Duties of the General Staff," p. 180.

† Essays on War Game, p. 16.

It is claimed that the periods of greatest success of the Prussian army in the present and past centuries immediately followed the times when manœuvres were considered of greatest value and were assiduously practised; and, that the decline of manœuvres —the loss of the true spirit—was in each case an important step towards disasters that followed.

The necessity for manœuvres, if anything, is greater than ever. The armies of the future will be larger than those of the past, and thus greater difficulties will surround the commanders in all their actions.

Abandoning small posts, as is now our policy, lessens the probability that officers will have opportunities to command and to act as staff officers. It follows that less facility will be given for the cultivation of the individuality and self-reliance which are such important elements in the character of an able officer. It therefore becomes important that in other ways officers be given ample opportunity to develop these faculties. By taking the officers away from the printed page, the line of file-closers, and the narrow rut of post routine, and placing them where the mind will be called upon to solve original problems in a practical way, an impetus will be given in the right direction. Field manœuvres great and small should prove of great value in attaining this end.

The Germans have an elaborate system of rules for peace manœuvres. They try to reproduce as far as possible the different phases of actual encounter, including the retreat of one side and the pursuit of the other when necessary. They prescribe, however, that whenever possible the soldiers of the side adjudged defeated should be left in the belief that in an actual engagement they would have been successful, thus aiming to inspire the feeling of invincibility which is expected to bear fruit in action where the odds may be against them, and where according to appearances they ought to give up the contest. General Dragomiroff advocates a different system. He does not believe in creating military pictures in manœuvres. He claims that no decision should be made as to who is victor and who vanquished because "where there has been no struggle there cannot have been a victory."* In the endeavor to educate the men in making, and resisting, a charge, he also discards the picture by having the attacking party pass through the opened files of the defenders, and then having them do so again at an increased gait. The English rules for the

* Preparation des Troupes au Combat, IIIe partie, p. 177.

conduct of field manœuvres, recently furnished by the Headquarters Department of the Missouri, are similar in most respects to the German rules above named.

To insure the greatest benefit, manœuvres should be made to approximate as closely as possible to corresponding conditions of war, thus:

1. Troops should be opposed to each other, varying in number and composition according to the requirements of the problem.

2. If the manœuvres are extended, *i. e.*, continue for more than a day, each day's work should fit in as a continuation of what has gone before.

3. The general situation assumed should be one that might actually and naturally exist; therefore the problem should be suited to the ground and the troops. In the German manœuvres the officer directing has authority to change the assumed situation whenever, by carrying out movements resulting from the original problem, excessive damage would be done to private property. In this country ground could usually be chosen at the beginning that would obviate this danger.

4. Manœuvres or field exercises on a small scale should precede the larger ones as preparatory steps.

5. To maintain the resemblance to truth, umpires should be appointed. These should be well fitted for their duties so that they will not be likely to give decisions at variance with the probable situation in actual war.

Both officers and men should be imbued with the spirit of the exercise. They should remember that at any given time the morale that would probably obtain under the supposed conditions in war must be considered, and not the morale of the troops simulating war. They should also remember not to attempt things that common sense, information, or experience, plainly show to be impracticable in war. Then umpires will have a less difficult and disagreeable task to perform, and more benefit will result to all.

Field manœuvres on a large scale are expensive and require a large number of troops. As money is hard to obtain, and as we have but few troops available, it is improbable that our prospective commanders of large armies will have many opportunities to command during such manœuvres. But this should not make us think that nothing at all can be done. In any war the officers who will be called upon to lead large armies and solve strat-

egical problems will be few compared with those who will be required to solve tactical problems while commanding their companies, battalions, or regiments. Provision can and should be made to give practical instruction to this larger class; especially as the training thus received will form a stepping-stone to success in higher commands.

For the instruction of these officers the manœuvres that can be carried on in the vicinity of the various posts should be of great value. Therefore such manœuvres should form a large part of the duty at these posts. A War Department order prescribing such is not necessary. Every able and energetic post commander can give the necessary orders himself.

The practical exercises in Minor Tactics at the Infantry and Cavalry School ought to be very valuable to all who take part, and the officers under instruction, when returned to their respective posts, should be of material assistance in securing the adoption of well-regulated manœuvres.

Although the benefit to be derived from all manœuvres is very great, yet in most cases I believe a previous course of instruction in Kriegs-spiel would enable the officers to appreciate the situations better and would insure their making fewer mistakes.

To give an example of such an unnecessary blunder, I quote the following from a newspaper:

"A London dispatch of July 6 says: 'The War Office has ordered an inquiry into the blunders committed during the summer manœuvres at Aldershot last Friday. It seems that a disgraceful collision took place between the Lancers and the Hussars on Fox Hills. A troop of the 11th Hussars tried to cover a battery of artillery which was being charged by a regiment of Lancers. The latter crashed into the Hussars. Forty men and horses were flung together in a struggling heap to the ground, and many of them severely wounded. General Wood publicly censured the commander of the Hussars for putting a mere handful of men against a whole regiment of Lancers at full gallop.'" As the commander of the Hussars was censured we have a right to assume that the chances of success were not as good for his force as for the other side. Therefore he should have avoided the collision. He would have been more likely to see things in this light had he appreciated the teachings of minor tactics and of the English exposition of the War Game.

KRIEGS-SPIEL.

This is a valuable auxiliary in the training of officers. It is a contrivance for simulating military and naval operations on a map by using troop blocks constructed to the scale of the map.

The name Kriegs-spiel—War-game or game of war—is a misnomer when applied to the modern type of this study. When first invented the game idea was the predominating one, and so the name was a suitable one. But when the plan was abandoned of trying to induce men to study the military art by means of this game, played ostensibly for amusement, and changes were made so it more nearly resembled the operations in war, the name was nevertheless retained. We have Von Mueffling's protest against this being considered a game in the following anecdote: In 1824 he consented to witness an exhibition. "He received the players somewhat coldly, but as the operations expanded on the map, the old general's face lit up, and at last he broke out with enthusiasm: 'It's not a *game* at all, it's a training for war. I shall recommend it most emphatically to the whole army.'"* "Kriegs-uebung"—or better, its English equivalent, "War-exercise"—would be a more appropriate name. This exercise brings a vivid picture before the student's eyes of the abstract rules he has learnt in text-books. Or, if he has not become familiar with such rules, it also serves the purpose of an instructor in this direction.

Although he may have read how valuable are shelter trenches when properly used, he might in action neglect to apply this theoretical information gained in former days until his men had suffered unnecessary losses. It is to be presumed he would soon exert himself to protect his men; but would he not have gained his experience in too dear a school? If in a Kriegs-spiel exercise he had acted thus he would have been informed of the estimated loss before obtaining cover, as well as after. In the discussion at the conclusion of the exercise his neglect and the effect of the same would have been pointed out by the umpire. Thus the theoretical information spoken of would have been impressed on his mind in a way not likely to be forgotten. Kriegs-spiel lends itself equally well to illustrate the movements of a small squad or of a large army. It can be used to solve strategical as well as tactical problems. It can also be used in conducting sieges and in solving problems of naval strategy and tactics.

*Wilkinson's essays on the War Game, p. 11.

As regards the method of conducting the exercises, the subject is divisible into two classes: "Free Kriegs-spiel," and "Rigid Kriegs-spiel."

In the first class, established rules and tables are not used by the umpire in making his decisions. Where competent umpires can be obtained, this system will do passably well. But, to fill the position acceptably, the umpire should have had extensive experience in modern war and should have mastered its teachings so as to apply them in making his decisions. It at once becomes apparent that men whose dictum would be received without question are few in number in any country, and especially so in our own. Major Raymond offers another objection. He says that the umpire "after he has conducted a few exercises, finds inevitably that he is acting in accordance with rules which he has consciously or unconsciously formed. Thus the choice we have to make is not between rules and no rules, but between rules based upon the careful study of all attainable data, which have stood the test of practice and the fire of criticism, and rules extemporized by a single authority, to be accepted without demonstration, and to be varied by every new director"* (as the umpire is styled by the Germans). In this system no attempt is made to ascertain the probable loss of the combatants from fire-action. The umpire simply makes a guess whether it will probably be large or small and decides accordingly. As it is admitted that fire-action will be the leading factor in deciding encounters of every kind except cavalry charging cavalry, every effort should be made to ascertain what the resulting losses will be. In this way a secure basis will be obtained upon which to build.

In the second class—"Rigid Kriegs-spiel"—rules for the conduct of the exercise, and tables to assist the umpire in making decisions, are prepared. A careful estimate of the probable losses from fire-action is also made. If at any time a calculation shows that the probable loss is very slight, so as not to affect movements, these are allowed to proceed and the estimated loss is recorded and added to others that may occur later. The greatest pains are taken to consider everything affecting fire, movements, and morale, and to make the exercise represent as nearly as possible what would actually happen in the field.†

* "Kriegs-spiel," p. 5.

† In making these remarks I am referring more particularly to Major Livermore's exposition of Kriegs-spiel contained in his book "The American Kriegs-spiel."

The umpire's duties in Kriegs-spiel are, to give information on the technic of the game when the players are inexperienced, to move the blocks, to make calculations, and to give decisions. It is of the utmost importance that these decisions be such as would probably be substantiated in war. Any visionary or improbable decisions may produce erroneous impressions as to the present status of questions in the military art, and might lead to disastrous results if an attempt were made to act in accordance with them on service.

The ideal umpire has been defined to be "some officer who has seen all modern wars."* This definition seems to me both too comprehensive as well as not sufficiently so. In my opinion he should be an officer who has taken part in all phases of modern war differing from each other, having commanded in just such cases as arise for his decision as umpire. He should be a man of sound judgment so that from what he has experienced and read he may make deductions that will apply in cases slightly different from those in which he took part. He should possess the faculty of commanding confidence in the correctness of his decisions and he should have an equable temper. As it is impossible to obtain the ideal, we must content ourselves with approximations. A careful study of campaigns of modern times, as presented by the most reliable authorities, forms a fair substitute for war experience.

These qualifications are more especially necessary for an umpire in "Free Kriegs-spiel" exercises. In "Rigid Kriegs-spiel" it is not of great importance that the umpire should have had war experience, or that he should have made an exhaustive study of modern wars, though this would be of material assistance when questions arise that cannot be answered by reference to rules or tables.

It is not as difficult to act as umpire in "Rigid Kriegs-spiel" as most people imagine. By even a limited course of instruction at the Infantry and Cavalry School, a large percentage of the student officers would become competent to act as umpires in simple exercises. By further practice and study they would acquire skill and ability to umpire more complicated exercises. In this way every post would soon have one or more umpires.

Among objections to Kriegs-spiel, frequently if not invariably

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* Essays on the War Game, p. 24.

made by persons who are imperfectly acquainted with the same, are the following :

1. The estimate of losses from fire-action is too great—or, too small—or, it is impossible to calculate such losses at all.

2. It is absurd to make decisions by means of dice.

3. The opposing troops are always supposed to be of the same quality.

4. Only ordinary and not extraordinary powers of troops are considered.

5. The game is difficult to understand, and it is tiresome.

In reply I have to say :

1. It is not to be denied that great difficulties attend the efforts to arrive at even an approximate estimate of probable losses from fire-action. Captain Mayne in his "Infantry Fire Tactics" shows how many disturbing influences there are that affect fire, and how difficult it is to come to any satisfactory conclusion as to what would be the effect of such fire in war. But great pains have been taken to ascertain what these losses would probably be, by reference to experiments made by different nations, and by ascertaining what losses have actually been inflicted on battle-fields. In this way a table of losses under normal conditions has been computed.* The normal effect for any given case is then modified by all tangible altering circumstances and in this way the minimum loss is estimated.

2. It is considered that after taking into account all tangible modifying circumstances the fire effect "can be calculated so nearly, that taking the greatest value as less than twice the smallest, the majority of cases will be covered."† A die is thrown to see what addition, if any, shall be made to allow for these incommensurable modifying circumstances which have not yet been considered. If one pip is turned up, no addition is made ; if two, an addition of about one-sixth ; if three, about two-sixths, etc. This certainly is a much better way than to leave the point for the decision of the umpire. He has nothing on which to base such decision and would be obliged to make it in a purely arbitrary way, which might be taken as indicating favoritism for the side benefitted.

A die is frequently used in determining the time it will take to

* This is my understanding of the way in which Major Livermore arrived at the data for his table of losses ; see p. 39 of *The American Kriegs-spiel*.

† *The American Kriegs-spiel*, p. 56.

obtain the range. A battery may be so fortunate as to find this at the first shot; and a whole line may fire for an hour, as did the artillery of the Prussian Guard at Sedan, before being successful. To decide this question the umpire, after considering the range, size of target, facility for observing the strike of projectiles, etc., makes use of a die to take account of such factors as again are incommensurable. In deciding the outcome of a charge, two dice are used. They are called into requisition for the same reason that has already been mentioned. If after taking into consideration all the tangible modifying circumstances it appears beyond a doubt certain which side will be successful, dice are not used. Dice are only made use of when there is no other way of ascertaining the probable value of influences about which we can obtain no data.

3. It seems hardly necessary to assert that the equality of opposing troops need not be supposed. Thus, as regards the normal fire effect of troops, riflemen (picked marksmen) are allowed twice the effect of average troops; recruits, one-half; dismounted cavalry, sixty per cent., etc. Any other reasonable suppositions are allowable, and are made whenever considered proper.

4. In connection with the objection that only ordinary powers of troops are considered I quote the following from "The Nation in Arms": "We must not in this place fail to point out a danger lying in Kriegs-spiel and in the excursions of the general staff.* In these exercises, which, in other respects we rightly value as being conducive to efficiency; as a rule, only normal achievements are presupposed, in order that the parties may fight under equal conditions. By this means we become accustomed to regard average performances as being those that are alone possible. But it is precisely the extraordinary performances to which, in war, great success—aye, even success altogether—must be attributed."

The Kriegs-spiel the author refers to is doubtlessly the Free Kriegs-spiel already mentioned.

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* Such an excursion or practice tour "is a sham fight, or rather a sham campaign carried out in the district chosen for the purpose by officers without men. The troops are imaginary, but the officers taking part in the exercise are assigned to the several posts of command, and upon the basis of the imaginary situation, communicated by the umpire, work out all the necessary orders and dispositions."—"The Brain of an Army." Note, pp. 90-91.

An exercise similar to this, but carried out on a map, is described in Lt. Wagner's article, "An American War-College," JOURNAL, M. S. I., 1889, pp. 295-96.

If ordinary or "normal achievements" are only "as a rule" pre-supposed, it seems clear that extraordinary ones may be supposed; and that, if any fault is to be found for these not being supposed with sufficient frequency, it must be laid at the door of the umpire or director.

There is, however, a valid objection to these exercises, viz.: If the chances are largely in favor of one side, the director always decides in favor of this side—notwithstanding the chances still existing in favor of the opponent. Thus the element of chance is not sufficiently considered, and, unconsciously, an attempt is made to have war approximate to the status of an exact science.

But in Rigid Kriegs-spiel as presented by Captain Naumann in his "Regiments Kriegs-spiel," and by Major Livermore in his "American Kriegs-spiel," the element of chance is given due allowance. As long as there is a chance for a side to succeed, it may succeed—thus allowing for "extraordinary performances" as well as ordinary ones.

4. The answer to the fourth objection has, in part, been given in what has gone before. That other than ordinary powers of troops are allowed for is shown by the following: While it is possible for a line of deployed infantry to be dispersed after a loss of less than three men per company, it may resist disintegration after having lost forty men per company (a company consisting of sixty-four men when complete).*

5. To be able to read a topographical map, to understand the characteristics of the different branches of the service and their relations to each other, and to know the meaning of a few pieces of metal—this is all that need be known to take part in a Kriegs-spiel exercise.

An officer should possess the first two requirements before coming to the Kriegs-spiel table; of the last he can there learn a sufficient amount in a few minutes to enable him to proceed. Taking part in exercises is the best way of becoming more thoroughly familiar with the technic. If an officer is deficient in the first two requirements he cannot fail to receive valuable information regarding them by taking part in such exercises. The game is only wearisome to the interested participant if continued too long. This results from the wearying effect that any continuous mental strain produces on the brain.

A certain amount of objection to Kriegs-spiel is due to the

* According to Livermore's "System of Kriegs-spiel."

disinclination that exists to making a change, or to doing anything that requires an effort.

There is another objection that I believe exists in the minds of some. It is, that the game is of German origin. We have copied some unsatisfactory things from the progressive Germans; but neither the recollection of this, nor prejudice, should lead us to taboo Kriegs-spiel. It should be rejected if found worthless, and for no other reason. Possibly it is unfortunate that we have retained the original name, and it would probably be well to adopt some other, such as "War Exercise," or one of a more descriptive character.

The object of Kriegs-spiel and its relation to the military art are often misunderstood. It is frequently imagined that by means of this exercise an attempt is made to present principles which are new and different from those contained in military text-books of accepted value. This is a mistake. All that is attempted is to illustrate these principles in such a way as to impress them upon the student's mind, and to make them of practical value to him.

Kriegs-spiel is of value in the following ways:

1. Taking part in the exercise necessitates a study of the topographical features of the map on which it is conducted; and this leads to a study of other maps. It is held by some that the maps to be used should represent a real stretch of country, so the student could take the map and go over the ground represented, impressing on his mind the relation between the ground and its representation. This method of procedure is undoubtedly an excellent drill. Every student should be able to form a picture in his mind of the ground the map represents. But after practice has taught one to imagine the topography represented, it does not seem necessary to visit the spot for instruction, and therefore the reason for having a map of real country no longer obtains. A map of an imaginary piece of ground enables the representation of a greater variety of features than would for instance be shown in a map of the country surrounding any army post taken at random. Such a map of imaginary ground makes it possible to use the same one to solve a greater variety of problems.

This further study of maps, as it is claimed will be induced by kriegs-spiel, is of great value. Napoleon was once asked from what kind of study he had derived most benefit. He replied: "J'ai pendre sur la carte."

2. A pen-picture of military operations is presented. To most

people it will not seem as real or life-like as that presented by manœuvres. But kriegs-spiel forms an excellent substitute as far as representation of troops and ground are concerned; while it is superior to manœuvres in that it more nearly reproduces the conditions of war. Major Berghaus claims that it is more instructive than manœuvres because in the latter, as in an actual engagement, "the individual participant sees very little as his horizon is very circumscribed. For this reason narratives of battles by subordinate commanders are always very one-sided, short sighted, or even false. But in addition it is impossible during a manœuvre to give proper consideration to the effect of expenditure of ammunition, of exhaustion from long marches, of losses among the troops, of burning villages, of destroyed bridges, of the moral effect of attacks, etc., etc., whereas all of these factors should be and can be considered in kriegs-spiel. Of course the leader—umpire in chief—in a manœuvre can make the supposition that 'this or that village is burning,' that 'this entrance is barricaded,' that 'such a squadron has lost fifty horses.' But in such a case only those know it who hear the decision, while in real life friend and foe would see these results, and in kriegs-spiel all the participants would be informed of this and could act accordingly." In manœuvres certain relations between opposing sides are always followed by the same decisions from the umpire. This would not be the case in war, and is avoided in kriegs-spiel. Although the chances for success may be in favor of one side, the other side may be declared successful after considering the element of chance, in kriegs-spiel, as might happen in war. I doubt if in a manœuvre an umpire would hesitate to decide in favor of the stronger side where for instance two troops of cavalry charged one-half their strength. That is, where—after considering the formation, direction of charge, nature of ground, and everything else that would affect one side or the other—the potential of the former was twice that of the latter. In war the success of the stronger side under these circumstances would not be a foregone conclusion. In kriegs-spiel the stronger force would be considered to have about eighteen chances for success as compared with about six for the weaker force. It is by taking into consideration that in war nothing is certain and that the unexpected is what usually happens, that kriegs-spiel becomes of peculiar value. The skilful commander, remembering that in war nothing is certain, makes such dispositions as will enable

him to take advantage of the unexpected. Then, if he is defeated at a certain point it does not mean ruin, for his dispositions are such as will make the defeat count the least possible; and if he is beyond all expectation successful, he is ready to reap the maximum benefit.

3. Opportunity is afforded for formulating orders; and, on the other hand, for interpreting and executing them. We have almost daily examples of the difficulty there exists in so wording an order that it will not be misunderstood. This difficulty would be greatly enhanced in war, where the quiet of the office is replaced by the bustle and turmoil of the camp or the field of battle. When we remember how much often depends on promptness and correctness in producing, apprehending, or executing an order, it is at once seen how important is a study that affords opportunity for practice and progress in this direction.

4. To give orders most successfully a commander must be able to suit their form to the characteristics of those who receive them. Whereas in one case it might only be necessary to indicate to the subordinate the end to be attained, as he could be trusted to make use of the proper means; in another case it might be necessary to go into minute details showing the various steps that must be taken to attain the end. The commander must, therefore, understand his subordinates perfectly, and word his orders to them accordingly, before he can command with the best results. This study of character, and application of the test as to the correctness of the conclusions arrived at, can be well made in the exercise under discussion.

5. The ability is acquired of coming rapidly to a decision on questions affecting military matters. With beginners the umpire stops the movements of both sides until they signify readiness to proceed. This is done to give them time to write or to interpret orders, to decide what to do, and to indicate what further dispositions they desire to make. When they show greater skill in performing these things the length of the stops is shortened, and finally the exercise is conducted without them—just as would occur in practice.

6. It leads to a true appreciation of the functions of the different branches of the service, and their relation to each other. Having acquired this, officers will not only use each branch to the best advantage but also the branches combined.

7. It trains officers to give their attention to the entire field of

action as depicted by sight and by reports from subordinates. Thus giving their attention to the entire field, commanders will no longer be engrossed by what is taking place in their immediate vicinity. They will no longer try to fight the battles with the fraction here located, but they will direct the troops in other parts of the field in such a way as to assist in the attainment of the object in view.

8. It is an incentive to study as deficiencies are laid bare and as the necessity for further information becomes apparent.

9. The discussion following a kriegs-spiel exercise (if properly conducted) will prove very beneficial to all present. Participants then have an opportunity of giving their reasons for various actions, and will hear what the umpire and others think about these. Certain dispositions and movements may have been made that the umpire can condemn without hesitation ; about others there may be a doubt. In these latter cases he should simply state his opinion —other officers doing likewise. In this way may result a strengthening or a correction of impressions, and an interchange of ideas that forms one of the more valuable features of kriegs-spiel.

In composing this essay the following works have been consulted :

"The American Kriegs-spiel." Maj. W. R. Livermore, Corps of Engineers, U. S. A.

"Kriegs-spiel." Maj. C. W. Raymond, Corps of Engineers, U. S. A.

"The Practical Value of the War Game." Capt. H. S. Wilkinson, 20th Lancashire Rifles.

"Essays on the War Game," by the same author.

"The War Game." Col. Lonsdale Hale, R. E.

"The Duties of the General Staff," translation from Von Schellendorf.

"Regulations for the Training of Troops for Service in the Field," translation from German.

"Beitrag zum Kriegs-spiel." Von Verdy du Vernois.

"Das Regiments-Kriegs-spiel." Captain Naumann.

"Das Kriegs-spiel." Major Berghaus.

"Studien über das Kriegs-spiel." Captain Michel.

"Feld-dienst-Ordnug." War Office, Berlin.

"La Préparation des Troupes au Combat." Gen. Dragomiroff.

THE PHYSICAL TRAINING OF THE ENLISTED MAN.*

By LIEUT. GEORGE F. E. HARRISON, 2d U. S. Artillery.

THE training and discipline of an army should be directed toward developing in each individual thereof such qualities and characteristics as will enable him to render the best possible service as a soldier.

It is far from the thoughts of the writer to attempt to make anything like comprehensive suggestions upon this subject. He ventures merely to drop a hint, to call attention to what he considers a step in the right direction—the introduction into the service of a course of systematic gymnastic training, accompanied by regular athletic exercises and periodic field sports.

In what way such a move may be made practicable, and how, if practicable, it will aid towards the attainment of the desired ends, may not at first sight be evident.

Whatever may be done in the way of physical improvement, how can we—it may be asked at the outset—arrive at the sought for moral qualities by processes addressed solely to the body?

Even on physiological grounds a satisfactory answer is not wanting. An able writer pertinently remarks: "Though we admit the truth of all the wise sayings with regard to a 'sane mind in a sound body,' we are yet too apt to regard the sound body as a mere accident of inheritance or environment. So we read the proposition as a hypothetical one, viz.: 'If the body is sound, the mind will be sane.' Few but physicians read it as indicating a connection between body and mind by means of which we can make or help to make a good healthy brain by making a good sound body. In the fact that the brain always seems to direct the body we are prone to forget that the body carries the brain and feeds it with its own life. If the body has good blood the brain will have good blood also. If the body does not furnish good material, the brain will do, according to its capacity, poor work or will not work at all."

But aside from the physiological aspect of the subject there

* Read before the Officers' Lyceum at Fort Adams, R. I.

are numerous considerations peculiar to the career of a soldier and to his relations to his comrades and superiors by which results, excellent both physically and morally, may be accomplished by such a course of training.

Why, it may be asked, elaborate upon and add to the physical training of the soldier, and hope thereby to attain to a degree of soldierly excellence, when his life is already so largely subjected to the physical ordeal? Why more training, where so much training already prevails?

That is just the point. The prevailing mode of training is not of the kind that is calculated, of itself alone, to do the required work. It does not even accomplish all that is expected of it as a process of merely bodily development; and as for creating any soldierly enthusiasm or *esprit* it falls wide of the mark.

While on this point, it may not be out of order to quote a few words from the work of Archibald Maclaren, director of the gymnasium at Oxford and author of the "Military System of Gymnastic Exercises" in use in the English service, and one of the most experienced authorities of the day on the subject of physical education. Speaking of a young recruit, he says: "What does such a youth gain in drill and parade for the development of his latent resources? He is not twenty yet, capable of receiving vast additions to his physical powers. What is there in his professional duties to supply the want? So little in comparison with his great requirements and almost unlimited capacity for improvement, and that little so partially and so unequally administered, that even its value is reduced. For he cannot attend a parade, walk a rifle range, cross a barrack yard or ascend a barrack stair, without giving employment to the muscles of his lower limbs although such employment be altogether inadequate to produce their full development; but it is abundant in comparison to what the upper limbs can receive. These must languish; these must remain relatively feeble, because they are kept without employment, and power is in relation to activity."

Referring to some experiments he was called upon to conduct, he writes as follows: "The first detachment of non-commissioned officers, twelve in number, sent to me to qualify as instructors for the army, were selected from all branches of the service. They ranged from nineteen to twenty-nine years of age, between five feet five inches and six feet in height, between nine stone two

pounds and twelve stone six pounds in weight, and had seen from two to twelve years service.

"I confess I felt greatly discomfitted at the appearance of this detachment, so different in every physical attribute. I perceived the difficulty, the very great difficulty, of working them in the same squad at the same exercises, and the unfitness of some of them for a duty so special as the instruction of beginners in a new system of bodily exercise,—a system in which I have found it necessary to lay down as an absolute rule that every exercise in every lesson shall be executed in its perfect form by the instructor previous to the attempt of the learner; knowing from experience how important is example in the acquisition of all physical movements, and how widely the exercises might fail of their object if unworthily represented by an inferior instructor. But I also saw that the detachment presented perhaps as fair a sample of the army as it was possible to obtain in the same number of men, and that if I closely observed the results of the system upon these men, the weak and the strong, the short and the tall, the robust and the delicate, I should be furnished with a fair idea of what would be the results of the system upon the army at large. I therefore received the detachment just as it stood, and, following my method of periodic measurements, I carefully ascertained and registered the developments of each at the commencement of his course of instruction and at certain intervals throughout its progress.

"The muscular addition to the arms and shoulders and the expansion of the chest were so great as to have absolutely a ludicrous and embarrassing result, for before the fourth month, several of the men could not get into their uniforms—jackets and tunics—without assistance, and when they had got them on they could not get them to meet down the middle by a hand's breadth. In a month more they could not get into them at all and new clothing had to be procured, pending the arrival of which the men had to go to and from the gymnasium in their great-coats. One of these men had gained five inches in actual girth of chest. Now who shall tell the value of these five inches of chest,—five inches of additional space for the heart and lungs to work in? There is no computing its value, no power of computing it at all; and before such an addition as this could be made to this part of the body, the whole frame must have a proportionate gain. For the exercises of the system are addressed to the whole body and

to the whole body equally, and before this addition could be made to the chest, every spot and point of the frame must have been improved also,—every organ within the body must have been proportionately strengthened.

"But there was one change—the greatest of all—and to which all other changes are but the means to an end, are but evidences more or less distinct that this end has been accomplished, a change which I could not record, which can never be recorded, bnt which was to me and to all who had ever seen the men most impressively evident; and that was the change in bodily activity, dexterity, presence of mind and endurance of fatigue, a change a hundred fold more impressive than anything the tape-measure and weighing-chair can reveal."

It needs no illustration, however, to prove the expanding, strengthening and invigorating effects of gymnastic training, systematically indulged in. That can reasonably be assumed to be an admitted fact. What it is particularly desired to demonstrate is its eminent fitness as a factor of military education.

From the most remote times the cultivation of the bodily powers was regarded by all warlike nations as the first and most indispensable condition to success. It is hardly necessary in a paper of this limited nature to allude to the educational methods of ancient Greece and Rome. Suffice it to say that proud as were the heights to which they attained in the intellectual sphere, they never subordinated the importance of the physical training of their youth to that of any other consideration, mental, moral or otherwise. To be a victor in the competitive athletic games was to reach the pinnacle of fame, and not only to entitle the winner to the highest civic and military honors but brought distinction to the State which he represented.

In the Middle Ages the jousts and tournaments proclaim the high esteem in which physical strength and prowess were held.

It was not until the period of the invention of gunpowder that we can record the decadence of physical culture. The revolution caused thereby in the weapons and mode of warfare seemed to proclaim the uselessness of bodily superiority, and all efforts at its acquirement were regarded as so much energy misspent. The nations of the world drifted into a state of physical lethargy and the human frame gradually deteriorated.

It was not until the dawn of the enlightened nineteenth century that the falling away of bodily vigor and the shortening of

the duration of human life were pointed out by physiologists and teachers, and a move made to remedy what was assuming the proportions of a serious evil. At this point attention is naturally directed to Germany, the foremost nation of the world in the promotion of physical culture. The great movement by which an equally important place was given to the physical as to the mental training in the compulsory education of every German, took its inception less than a century ago. Under the intelligent auspices and persistent efforts of such popular teachers and writers as Guts-Muths—John and Spiess—such a lively interest was created among the masses that schools for the development of the bodily vigor of German youth were established throughout the land. So great was the enthusiasm created by Freiderich Ludwig Jahn—known to all German turners as "Father Jahn"—and so widespread was his influence among the people, that the government became alarmed. Jahn and the Turners were accused of being liberals and enemies of the State. Jahn was thrown into prison, and in 1819 throughout Prussia and Germany the gymnasia were ordered closed. This high-handed and narrow-minded policy was, however, of short duration. Jahn was released in 1825, although forbidden to reside in any town which contained a university or a gymnasium, and lived to see gymnastic institutes authorized in 1842 by royal decree in the army and all the higher schools.

The new crusade in favor of physical education soon extended itself throughout Europe. The military bureaus of all the leading powers were not slow to appreciate its efficacy. They awakened to a full recognition of the importance of gymnastic exercises as a factor of military training. This recognition received expression in the adoption of regular systems of bodily training which now form part of their regulations, and are enforced with as much care and jealousy as any duty whether of drill or guard.

A glance at the methods of training of some of the foremost military powers will not prove uninstructive in this connection.

ENGLAND.

The English service, from which we have drawn so much for the groundwork of our own, has adopted a regular system.

In addition to the drills in the gymnasium, the regulations prescribe a "running drill" for all the infantry regiments, the manner of conducting which is minutely laid down. A compre-

hensive and carefully arranged system of exercises for the use of the army has been prepared at the order of the government, by Archibald Maclaren. At Aldershot there has been established a regular school of gymnastic instruction to which are sent officers and non-commissioned officers to undergo a course of training with a view to becoming inspectors and instructors. At every military station, at home and abroad, have been erected or are in process of erection, gymnasium buildings, equipped with every form of appliance. In fact, the government has made every provision to insure for her soldiers sound, vigorous and active bodies. A glance at the physique and set-up of the average British soldier is confirmation of the efficacy and excellence of the work.

GERMANY.

As to the attention given to gymnastic and athletic work in the army of Germany allusion is hardly necessary. It has been given a place of such prominence in the education of the German soldier that the fact is well known to all the world.

Rothstei, in his account of the "Centralturnstalt," published in 1861, described the "obstructed running track" where the pupils were exercised in "applied gymnastics." The track was U-shaped, 195 paces long and 18 feet broad. The obstructions were arranged in the following order:—1. A ditch 6 feet wide for the running leap. 2. A mound of earth, 3 feet high and 4 feet wide at the base, for the high jump. 3. A ditch 12 feet wide for the long leap. 4. A mound, 6 feet high and 10 feet wide at the base, on the edge of a ditch 12 feet wide, for the "deep leap." 5. A board fence 5 feet high, to be vaulted over. 6. An "escalading stage" 12 feet high and 6 feet wide at the top, to be climbed by ladders, ropes or poles, and jumped or dropped from. 7. A ditch 10 feet deep and 9 feet wide, with an escarpment wall rising 4 feet above the hither edge of the ditch and bridged by a shaky beam. 8. A palisade 7 feet high of sharpened planks: and, 9. A glacis. A section of twelve men in three ranks of four files each, the men having muskets, side-arms and knapsacks usually made the entire course from end to end, in three to three and a third minutes. Without weapons or knapsacks, four men, each doing his best to outstrip his fellows, usually covered the course in sixty to seventy seconds, while a few individuals were able to cover the course in forty-three to forty-five seconds."

After contemplating the foregoing one can readily accept the

following extract from a circular on the teaching of gymnastics published in Liegnitz, province of Silesia, in 1871, by the Section for church and school affairs. "It is acknowledged everywhere by soldiers and civilians that the astonishing accomplishments of our armies in the late war, especially their thorough discipline, exhibited in the most cheerful and self-sacrificing manner, their skill in overcoming natural and artificial obstacles in the enemy's country, their courage and calmness in battle, the resolution with which they bore pain and privation, must, in a large measure, be attributed to the gymnastic training of the rank and file."

FRANCE.

France has proved herself alive to the importance of the gymnasium as a factor in the attainment of military excellence, and has kept pace with her powerful neighbor in the advancement she has made. If elaboration of detail, number of apparatus and variety of exercise, be regarded as evidence of progress, she has even surpassed her German foe. As in the English and German services, the course is divided into two distinct heads. One embraces all the exercises "propres a l'assouplissement" which are intended for the bodily development of the individual man, and, as such, have no special professional character; the other refers to the "exercises d'application," and includes all the exercises which bear on the accomplishment of feats of a peculiarly military nature,—in other words, exercises which will best prepare the soldier to meet the demands likely to be made upon him in a campaign.

Reference to the other military powers of Europe is deemed unnecessary, although a study of the military systems of each and all of them reveals the same lesson of thorough appreciation of the importance of physical training in the education of the modern soldier.

Now if it be admitted that gymnastic instruction should be made an essential part of the training of the U. S. soldier, it must likewise be admitted that the said instruction should be administered systematically and under the direction of the War Department. The War Department should take the matter in hand and issue orders by which the amount, kind, and manner of instruction shall be prescribed and defined, so as to insure uniform instruction throughout the service. It must not be disposed of by general prescriptions or suggestions to post commanders.

Haphazard, spasmodic work in this line is worse than none at all. It should be regulated with as much care and deftness as are the prescribed tactics and drills. A board of officers should be convened to devise a regular system of gymnasium tactics, if the word may be so applied. The Quartermaster's Department should be directed to bend its energies to getting up plans and specifications for a suitable gymnasium building to be constructed at every post in the army, the said building to be light, airy, well-ventilated, provided with heating apparatus, and convertible. By "convertible" I mean that the interior disposition and arrangements should be such that at any time the building could be converted into a hall for general purposes, such as lectures, dances, indoor squad or company drills, and numerous other purposes for which the need of such a building at an army post is so often urgently felt.

Most of the gymnasia recently constructed throughout the country have been made convertible as suggested above. A simple contrivance by which all the apparatus is hoisted to the ceiling accomplishes the desired end with little or no trouble. The apparatus need not be elaborate or costly. In fact, it is desirable that the apparatus be few and simple. For military purposes a gymnasium would be excellently equipped if provided with dumb-bells, Indian clubs, parallel bars, horizontal bars, vaulting-horses, spring-board, ladder plank and vertical ropes and poles for climbing.

The only additional expense to the enlisted man would be the purchase of gymnasium shoes. The ordinary fatigue jacket, would, in lieu of something better, answer gymnasium purposes sufficiently well. The instruction should be by companies. Each company should have an hour assigned it. A commissioned officer from each company should be present to superintend the instruction. The actual instruction should be given by non-commissioned officers who are themselves skilled in the use of the different apparatus. At first it may be somewhat difficult to find competent instructors, but the system itself, after a year or two of operation, will develop excellent material for the purpose. From half an hour to an hour's instruction daily would be sufficient for each company. The work should be confined to an honest endeavor to develop health, strength and endurance. No tumbling, no lofty and showy feats on flying rings or bars, no exercises that involve over-exertion, strains or risks of

any kind. It should be a simple, rational progressive series of exercises, each preparing for and leading into the next in order of succession, so that every muscle and every joint of the body is reached in due order and acted upon according to its requirements.

If possible every gymnasium should be provided with simple but commodious bathing arrangements, consisting of numerous showers. After each day's exercise every man should be made to strip, step under a shower, receive a douche, dry off and dress again without delay. The wholesomeness of this measure, as regards the health and cleanliness of a command, is incalculable. A small locker of open wire netting, large enough to contain jacket, shoes and towel, should be furnished for each man.

In connection with the gymnasium, and, if possible, in close proximity thereto, should be a cinder track. There is hardly a military reservation in the country where space may not easily be spared for this purpose. The cinder track should be made not merely a useful adjunct to the gymnasium ; it should be made to play a conspicuous part in the regular course of training. It is the means by which a healthy incentive can always be held out for the performance of good work in the gymnasium. Here will take place all the contests for supremacy. These contests will arouse and keep alive a spirited rivalry which cannot fail to produce excellent military results. On the cinder track will take place the exercises in running, jumping and vaulting,—exercises that, of all others, are admirably adapted to the development of those powers that are most required on the march and on the field of battle.

Many reforms have recently been introduced into the army. Much has been done of late years to reduce the evil of desertion. Discontent is almost invariably the precursor of desertion. Many a good man has been made to lose sight of the sacredness of his oath of enlistment by grievous disappointment and unbearable discontent with his work and his surroundings. The evil which has produced more disgust and consequent desertion than any other,—the one great curse of the service,—is the everlasting sending of men to drill for the one sole purpose of "giving them something to do." The never ending "Fours right" and "Fours left," has been the bane of the enlisted man's existence. Drill should have one object that should never be lost sight of,—instruction. As soon as it ceases to be instructive, it should cease

altogether. When men have become proficient at drill, when they have learned all that can be taught them, its continuance should be regarded not only as a serious military mistake but a silly one. American soldiers are intelligent. They will go with a good will at any work, however laborious, that they know to be necessary, or that is done with an object. But let them see that they are being made to work, not to accomplish anything, but to work simply for the sake of working, and they will naturally resent the imposition. What should be a dignified duty becomes detested and onerous to a degree. The important duty of drill resolves itself into a treadmill occupation, baneful and disastrous. Add to the reforms of recent years the reform of dispensing with drills except when they are instructive and beneficial, and the master stroke will have been made.

How, it may be asked, keep the men out of idleness? Give them something to do that, besides being simply an occupation, will be of manifest service and benefit. The tendency of modern tactics is in the direction of simplicity and fewness of movements. Of the technical there is less now for the enlisted man to learn than there was in the past. Drills are simple and more easily acquired. There is less necessity for frequent drills now than ever.

The training of an army is to be directed, henceforth, not so much at the handling of masses as at the development of individuals. That is the great lesson that we of the army have to learn. The ultimate end of military instruction, as regards the enlisted man, is no longer the making of him a willing responsive machine; far from it. The soldier of the modern skirmish line must be a man of quick perception,—active, vigilant, resolute.

Nothing will so tend to the attainment of that end as the adoption of a system for the development of our enlisted men through the gymnasium, the cinder-track, and the field of sport. Simultaneously with the development of the physical powers through these means, all the moral faculties will be brought into play and receive an impetus such as books and theories could never bring about. Let any military student who doubts the truth of the above statement attend a well contested game of foot-ball (Rugby rules), such as is constantly taking place between our colleges and universities. He will witness an actual battle where every inch of ground is fiercely contested from the beginning to the finish. Let him closely watch the contestants. It is

a struggle wherein it is difficult to say which plays the greater part—the brain or the brawn. He will have right under his eyes a conspicuous display of all the qualities that would suffice to make a superb soldier—strength, agility, coolness, fearlessness, determination—all in subjection to one directing mind. It is a grand object lesson for a soldier; one over which he may well ponder, and from which he may draw many valuable deductions. He will witness an ideal battle in which superior head or strength or both finally win the day. What perfection of discipline and training! Let him investigate and discover how such conditions are brought about. The contestants, he learns, are men of exceptional intelligence and attainments, such, of course, as he could not hope to find in the ranks of the army. That, however, is only a question of degree, and will not affect any principle or theory that may be involved. What kind of training have they been pursuing? Be assured that Horace and Xenophon have cut but a small figure therein. The answer resolves itself down to the fact of a systematic, progressive, continuous course of work in the gymnasium, accompanied by honest and persistent exercise upon the cinder-track and ball-field, together with regularity of life as regards eating, sleeping, clothing and bathing.

There is nothing about the method that cannot with the utmost facility be pursued in the army. In the past ten years there has been a marked move by the schools and colleges of the country and by the people generally in the direction of gymnastic and athletic training. Magnificent gymnasia and athletic clubs have been established in all the cities of the United States. During that period more money has been expended for this purpose, several times over, than in all the previous years of our national life put together. The results are made manifest in an increased strength of physique, erectness of carriage and manliness of bearing. Doctor Sargent, the director of the Hemenway Gymnasium of Harvard College, in his address before the "Conference on Physical Training" held in Boston in 1889, said: "We have to-day on our record books at Harvard the names of two hundred and forty-five students whose test of general strength (of arms, chest, back, legs, lungs, etc.) surpasses the test of the strongest man in 1880."

The army, which, for manifest reasons, should be the hearty coöperator, if not the leader, in such a movement, has supinely stood by, looked on, and done nothing. The popular idea of a sol-

dier is a man of commanding presence, erect stature, broad shoulders, strong, graceful, neat. Is that the picture that we, in reality, hold up to the admiring gaze of the citizen? Is not the average soldier, as he is casually met in the street, rather the very reverse? Is he not,—to be candid with ourselves,—in many instances a shiftless, untidy, slouchy looking individual? And yet one of the apologies we construct for ourselves is the fact that the people have no pride in their soldiers, that they frown them down and make outcasts of them.

Our enlisted man is the best paid, best clothed and fed soldier in the world. Who would believe it to look at him? The fact of the matter is, the blame is entirely upon our own shoulders. He does not look like a soldier simply because we do not make a soldier of him. Make a better man of him for having become a soldier and everything else will follow. Make of him a gymnast and an athlete, in the proper sense of those terms, and you will make a man who will of necessity take a pride in himself; and pride, after all, must ever be the foundation of the ideal military structure.

Comment and Criticism.

(The remarks under this head have, generally, been invited by the Publication Committee, which desires that, as far as practicable, these "Comments" should appear under authors' names.)

I.

"Infantry Fire."

Lieut. John R. M. Taylor, 7th U. S. Infantry.

IT will probably interest the readers of Lieut. Davis' interesting paper in the March number of this magazine, to see the result of the advance of a firing line conducted under service conditions and in the manner prescribed in the Infantry Drill regulations. These figures will, I trust, induce others beside the writer to believe that it would be well not to too sweepingly condemn the present system of Rifle practice, that it would be well to wait until an extended series of experiments had shown it to be more defective as a training for actual warfare than the writer considers it to be. It is probable that it would be found that the men who fire year after year and who are thus accustomed to note on the range the appearance of objects at measured distances day after day under varying effects of light will be found more competent to give a correct estimate of an unknown distance than their officers who are not accustomed to the same careful observation, but this is not the fault of the system—merely of the way that it is carried out.

The target in this practice consisted of three rows of silhouettes, sixteen in each line, placed about four yards apart and arranged as in the target for volley firing. This target was placed about four hundred yards from the range and on such ground that the advance of the firing party would be over ground out of sight of the range so that there could be no assistance from the known and measured ground over which the men had been shooting. The officer in charge of the firing line had walked over the ground alone but had taken no measurements. He was the only man who went over it before the shooting began. Until the company was formed they did not know what practice was to take place nor from what point the firing was to be done.

The firing line was composed of twenty-three men, not selected but merely men who were classified and were not on other duty. The first volley was at about 1400 yards, the officer in command of the firing line made a mistake in his estimate of the distance, five rounds were fired with no hits. The second series was at a distance estimated at 1300 yards, five rounds were fired, thirty-five hits. Line of squads was then formed, the chiefs of squad directing the firing in their squads, two rounds were fired from a distance estimated at from 950 yards to 1025 yards; result, forty-three hits. The next halt was made at a distance estimated at from 650 to 800 yards, two rounds were fired; result, thirty-five hits. The third and last volley from squads was fired at a distance estimated at from 575 to 600 yards, two rounds were fired with thirty-five hits. The squads were then deployed as skirmishers and at a distance of about 500 yards fired two rounds, at about 425 yards they again fired two rounds; no further shots were fired. The skirmishers estimated their own distances and the result

of their four shots apiece was, sixty-nine hits. The shot-holes were counted by an officer, between each series, and the holes were clean holes, a double-ended hole made by a bullet passing sideways was counted as one.

Out of the 442 shots fired there were 182 hits, a percentage of 41. This result speaks well for the system under which the men were trained, it is not free from faults but a system which will give such results must have very good points indeed. The company making this run is composed of men of the same class that forms the others of the army. With the same interest in results on the part of the officers the men will do as good work.

II.

"Prussian Great General Staff."

Colonel E. P. Pearson, 10th U. S. Infantry.

I ESPECIALLY commend the excellent article by Captain Bingham on the "Prussian Great General Staff" in the July number of the JOURNAL OF THE MILITARY SERVICE INSTITUTION. I think the following extract from it should be read in connection with page 8, of the translation (Harper) of "The Franco-German War," by Von Moltke.

Captain Bingham says: "It is known that all possible wars and campaigns are worked out beforehand by the Prussian General Staff. This is done by means of the War Game. Plans are elaborated to the last detail. Before they are finally approved and laid away till wanted, they are played out on a large scale before the assembled officers of the General Staff, the commanding generals of army corps and all other high commanders of every degree, including the Emperor. The whole campaign is explained on the huge maps laid out before the assembled audience. Difficulties are discussed and different solutions played to their conclusions to see how they would come out. Every possible movement of the enemy is carefully thought out, illustrated on the map, and the proper anti-movements adopted. Each commander learns just what is expected of him and his command and goes back to his garrison to perfect both in their parts.

"The result is well illustrated by an anecdote. After war had been declared in 1870 von Moltke was met leisurely strolling on the street by a friend:

"'I suppose you are very busy now, General?'

"'Oh, no!' replied von Moltke, 'I've nothing at all to do *now*. The work was done long ago and it only remains to execute it.'"

A novice in war might thus be misled with the idea that it is practicable to work out an entire campaign in advance, in detail. Hear the great von Moltke himself, who says of the German invasion of France:

"But above all, the plan of war was based on the resolve to attack the enemy at once, wherever found, and keep the German forces so compact, that a superior force could always be brought into the field. By whatever special means these plans were to be accomplished, *was left to the decision of the hour; the advance to the frontiers alone was preordained in every detail. It is a delusion to believe that a plan of war may be laid for a prolonged period and carried out in every point.** The first collision with the enemy changes the situation entirely, according to the result. Some things decided upon will be impracticable; others, which originally seemed impossible, become feasible. All that the leader of an army can do, is to get a clear view of the circumstances, to decide for the best for an unknown period, and carry out his purpose unflinchingly."

* The Italics are my own.—E. P. P.

Reprints and Translations.*

NOTES ON THE FIELD GUN OF THE FUTURE.†

(Apropos of the recent work by General Wille.‡)

By GASTON MOCH, Capitaine d'Artillerie.

Translated by Captain Frederick A. Mahan, Corps of Engineers.

INTRODUCTION.

I.—*Possibility of an early change in field matériel.—Condition of the question in Germany.*

DURING a period of twenty years, the war musket underwent three fundamental changes; breech-loading, repeating, and reduction of calibre. From these followed as many improvements in the armament of infantry, except in those countries which, at the risk of being taken unawares, have held back in order to husband their resources by taking the last two steps at a single bound.

While this was going on the field-gun remained sensibly the same. The principal armies adopted their present pieces at nearly the same time and with about the same conception of the effects to be obtained therefrom §; hence the conditions of service and the ballistic properties of the guns differ little, at least in those countries which have not held unduly long to the use of bronze. Since then, improvements in detail have undoubtedly been made here and there, but nowhere has a systematic change, resting on a new programme, been begun.

Does this mean that the science of the maker in this department has stood still? Most certainly not. There are plenty of inventors who have in their portfolios systems which are probably better than the models in use and are only awaiting the sanction of experiment. But the general making over of the field equipments of any power involves expenses the enormous amount of which has been sufficient to shut off every reform of this sort up to the present time. Each one says that its matériel, inferior on one point superior on another, is on the whole as good as that of its neighbor; and

*Please address communications concerning reprints, translations and reviews to Lieut. J. C. Bush, editor of this department.

†Das Feldgeschütz der Zukunft par R. Wille, General-Major à la disposition. Berlin. R. Eisenschmidt, 1891.

‡See the *Revue d'Artillerie* October, 1891, vol. xxxix, p. 87.

§ The dates of adoption of the regulation models in the great armies are: Germany, 1873–88; Italy (7 cm), 1874; Austria, 1875; Italy (9 cm), 1876–81; France, 1877; Russia, 1877–79; England 12 pdr. B. L. (76. 2 mm), 1884.

above all, it has no special desire to begin a task, in which it will be surpassed at once by others who will profit by its studies, develop its advances and avoid its errors. So easily can one be self-deceived on a subject which scarcely admits of any doubt, that there are countries to-day which, for lack of means of production, shut their eyes to the evident superiority of steel over bronze.

But let a great state finally make up its mind, not to some small change of detail, but to a complete change throughout, marking a real advance, when all the others will be seen following in its wake at once whether they wish or not.

By the term "complete change throughout" is meant the adoption of a matériel entirely different from that now in use, and not simply a change which involves all the field equipage at once. Some one nation may, however give up uniformity of matériel and bring about its perfection in an entirely normal way which shall cause no real financial crisis. Whatever may be the respective advantages and disadvantages of this system, its adoption by a great power could only hasten on the armament fever. If hesitation prevails everywhere in replacing the matériel, it is due, perhaps, less on account of the great sacrifice to be made than through fear of seeing the new arms imitated and surpassed as soon as adopted. But were it ever decided to localize improvements, this fear, which now acts as a wholesome brake, would be less strong and the change would become continuous. Work would go on everywhere by successive leaps, so to speak; several kinds of matériel would be in use at once, each more or less abreast with the latest advances of science, but not one entirely out of date.

Hence we must be careful not to declare a new general crisis in armament as unlikely on financial grounds. Nothing in the condition of our matériel as compared with those of other countries, can cause us to make the start. But we may be forced to make the change any day, and it is known that in such an event financial means are, fortunately, never lacking in France.

2. Perhaps this time is not so far away as is generally thought; the preliminary symptoms can be discerned.*

For some time the German military journals have frequently given utterance to the necessity of replacing their army's field matériel, the oldest now in use; they are no longer afraid to admit its inferiority to ours, which they have always disputed heretofore. These theoretical discussions, accompanied by premature but persistent rumors about the adoption of a new matériel, had at least the effect of throwing discredit on the old, as complaints have frequently been made about it; they can but hasten the time, desired perhaps in higher places, when opinion will force authority to act. Therefore it is not surprising to see appearing in the budget for 1892–1893 an extraordinary credit of 51 million francs, as the first annual instalment of a sum of 133 millions for the acquirement of artillery matériel.

Viewed in this light, the publication of General Wille's book: "The

* According to Colonel Langlois, Professor of Artillery Tactics at the Ecole Superieure de Guerre, the new French gun will be a quick-firer with a light metallic shield and capable of discharging a projectile weighing five kilogrammes at the rate of eight to ten rounds a minute.—*United Service Gazette.*—Ed.

Cannon of the Future" assumes the proportions of an event. The high standing of the author, his previous reputation as a technical writer and the very title of the book caused many persons to believe that his propositions had already been adopted and that the "cannon of the future" described by him was merely the future gun of Germany. This opinion is now going the rounds of the press in France, but there is every reason to believe that it is wrong. In the first place, we hope to be able to show in this study that General Wille's project cannot be realized at present, unless Germany, unknown to every one, should have lately made progress in every branch of industry which will probably not be seen by the present generation. Then, it is not the habit of general staffs to cause a detailed description of the matériel which they are constructing secretly to be published beforehand; nor do generals, even on the retired list, divulge this knowledge; nor do governments let such treason go unpunished. Finally the military organs which, right or wrong, are looked upon as official in Germany, are so unanimous in declaring the project one that cannot be carried out and which is bad from a military standpoint, that it is hard to believe they wish to discredit the future matériel in advance, after having complained bitterly of the contumely heaped on the old.

If then we do not know what the Germans are doing (assuming that they are preparing for a general reform), there are the best reasons for believing that the *cannon of the future* is not their coming gun.

Nevertheless, General Wille's work has given rise to a long-continued and carefully studied polemic, in which may be gathered many details of ideas current among our neighbors, and which may give useful pointers as to their probable intentions. Hence it is very interesting to pick to pieces and analyze the work and the polemic at the same time, as though to mark the shots. The occasion will also be seized to point out a few interesting methods of discussion and comparison, for meeting which few chances occur with us.*

II.—*On theoretical discussions and the pursuit of studies in matériel.*

3. General Wille makes at the end of his book, an advance protest against any discussion of his ideas: "I know very well," he says, "that it is easy to combat theoretically, and with apparent success, everything which from its very nature excludes *a priori* the categorical yes or no of mathe-

* The principal organs which have taken part in the discussion are the following:

The *Militär Wochenblatt* opened the fire of the critics in No. 77 of 1891; General Wille answered (No. 90), and the *Wochenblatt* answered (No. 100), to receive a rejoinder from the author (No. 107); finally No. 110 contains a critique, taken rather from the tactical side of the question and advocating the use of field howitzers;

The *Archiv für die Artillerie- und Ingenieur-Offiziere* fully concurred, (in its October number) with the criticisms of the *Wochenblatt*;

The *Deutsche Heeres Zeitung* (No. 73 and 74) publishes a criticism of the project which agrees remarkably with that of the *Wochenblatt*, with which it coincides as to date;

The criticism of the *Allgemeine Militär Zeitung* (No. 75) must be mentioned as well as General Wille's reply in the same journal (No. 86);

The criticism of the Austrian Captain Kuczera in the *Mittheilungen über Gegenstände des Artillerie und Genie-Wesens* (No. 11);

Finally, the article in the November number of the *Rivista di artiglieria e genio*, more analytical than critical, and tending to doubt the possibility of realizing General Wille's project.

matical proof; it can be thus cast down, at least in the eyes of him who holds the opposite opinion. But to my way of thinking, the question can only be properly answered by practical execution and experiment. * * * Many things change in the military art, but there is one truth which always stands: *it is better to try than to study.*" This motto closes the book which bears as its epigraph: "*Prove all things, hold fast to that which is good.*"

Before beginning this discussion which the author deprecates, it will be well to show how legitimate it is; for without this precaution there would be some presumption in attacking so high an authority. We are convinced it is true, that the vast horizons displayed to field artillery by the author are but the effects of a mirage, which, through his eyes, brings near a still distant end; but we should have hesitated to say so had it not been for the unanimity with which his countrymen, figures in hand, contradict the learned general, and had he himself not set the example by taking as the starting point of his work the very theoretical discussion of a system, indefensible though it be, which had been previously presented by an inventor.

In the first place, to try the Wille gun and its ammunition, they must have been made. There has been no question of that as yet. All through his work, at every chapter, the author brings out results which are still far from attained, and he is satisfied to affirm his conviction that they will certainly be reached. The question is to know when this will happen. Meanwhile the project is wholly theoretical, and it is quite as permissible to contest his data as it is to present them.

But should theoretical discussions be so disdained? and is there not danger in this way of advancing blindly? Is not the very work of which we speak founded exactly on these theoretical ideas, since all the criticisms against him rest on the practical impossibility of realizing his views now?

It is very just to say with General Wille, that a fruitless endeavor may contain the germ of a future advance (were it only, let us add, by definitely condemning the idea tried). But in the two hemispheres there are certainly taken out several dozen patents a week, on an average, relating to armaments. All are not wholly valueless. And yet where is the country willing to try everything in the hope of finding here and there a package of good grain? Hence authors and inventors must make up their minds to have their ideas pass through the sieve of discussion and to adapt the motto, "study, *then* try."

4. But how to study?

When the time comes in which the change of armament must be made, it will evidently be too late to begin studies which are the work of years; so soon as such a step is decided on in principle, the time for construction is at hand.

It would not be enough then merely to have these studies in hand. In such a case we run the great danger of hurrying the issue under stress of need. In the points which require clearing up we must content ourselves with a solution similar to that which existed in the condemned system or in some other like it. The final result is a hybrid creation, on which ere long much time and money will again be spent in changes. Every country furnishes examples of such discomfitures. Then it is that the truth of this phrase

of General Wille is proved: "When twenty years of hard work have been spent in changing, and, if needs be, in *unchanging* the matériel, it may be found in the end that as much and more time and money have been spent for a smaller result than if the old gun had been replaced by a new one at the end of ten years, and changes in both would have been saved. Repeated changes weary the troops, make instruction hard, generally load down the matériel, and may well end by weakening the whole."

On the contrary, the end to be proposed is to direct the studies in matériel so as to be prepared to begin immediately, at any moment, the construction of an armament all the parts of which shall be equally abreast with the present condition of science.

5. But the conception of a system of artillery is one of the most complex things in the world. Each of its elements, when once determined, reacts on all the others and helps, in its return, to determine them. Hence very many contradictory conditions are encountered among which one thing must be taken with another, depending in turn on considerations of tactics, of service and of industrial possibility, which make it necessary to subordinate to each other the different *desiderata* which were held in view. A single inventor could not alone extricate himself, the same mind would reach wholly opposite conclusions according as it had been educated as an officer commanding troops, an artillerist or a metallurgist.

Hence it is indispensable that every practical trial should be preceded by a theoretical study, from which we may determine especially in regard to tactical considerations the principles of a programme which appears capable of realization. This programme having once been submitted to the consideration of inventors, we may regard it as certain that propositions will not be lacking.

Then the systems presented will be studied comparatively, the experiments being carried out as fast as is compatible with their being well done. It is mainly a matter of money, and it may be supposed above all things that funds will not be skimped for experimental boards when it is a question of clearly defined objects, expenditures of this sort being real economy. In this way preference will be given at last to one system which will be studied to the very end, even to the details of the tools necessary to construct it.

This system would then be *adopted in principle*, to be constructed eventually when circumstances may demand. This adoption would not prevent in any way the careful examination of any system presented afterward which may appear to offer new advantages. This latter, after having been thoroughly studied might replace the former in its position of expectance. But it should be well understood that, when the existing matériel is to be replaced in whole or in part, the construction of the "*adopted-in-principle*" system will be undertaken at once to the exclusion of all others under trial.

If it be a question of the partial or entire change of the armament of a power, this way of working which would guard against hasty resolves, would lead apparently to the best agreement between the financial interests of the State and the highest possible degree of perfection in the matériel.

The main point is not to begin such an undertaking without knowing

where it will end. The remark may seem superfluous; and yet how many times have we seen a country continue to experiment and change after wholesale manufacturing has been begun; that is, when there should be no thought of anything but pushing ahead relentlessly and with all possible speed? The reason is that, too often the ideas of an inventor are hastily admitted in a lump, although it is evident that all of them are not equally adapted to the conditions demanded of a war matériel.

It is not required, surely, that experimental boards should themselves introduce or demand of the inventor fundamental changes in what has been submitted to them. Save in improvements of details, the chances are a hundred to one that this collaboration will only bring forth bastard products of less value than the first model.

What is necessary is that there should be no obligation to examine the thousand queer propositions, differing from each other in matters of principle, which the vague announcement of a change cannot fail to call forth. The inventor is the servant of the fighter. He must work on a rational programme, at once tactical and technical; such a programme can only rest on theoretical studies based on practice, that is, the accumulated experience of the past joined to the knowledge of the present condition of science.

III.—*Fundamental elements of a system of artillery.*

6. The determining elements of a system of artillery are, according to General Wille:

The weight of the projectile (in absolute value);

The calibre;

The weight of the projectile per unit of surface of cross section (to be called for brevity, the *sectional density*);

The initial velocity;

Accuracy;

The nature and classification of projectiles;

The ammunition supply of the battery;

The mobility of the battery.

7. This list can be reduced by half.

It is useless to introduce the sectional density of the projectile, as it follows at once from the combination of the first two elements.

The supply of the battery and its mobility are also two elements to be considered at the same time.

As to the nature of the projectiles, we will admit, without further discussion, that shrapnel and torpedo shells * will be used; all artilleries are tending that way. As to the proportion according to which the two kinds of projectiles will be divided in the ammunition chests, that is an affair of experimental tactics. Whatever we assume this to be at first, a few battles may change it without altering in any way the general conditions of the artillery system. Moreover, the change can be easily accomplished when fresh supplies are brought up, hence there is no need to look upon this point as fundamental.

* This is the *obus brisant* of the French or *sprenggranate* of the German, that is, a shell filled with melinite or any other kind of ite.

The accuracy of the projectiles cannot be foreseen; it varies with their initial velocity, their exterior form, their sectional density, their speed of rotation, the position and outline of the expansion ring, all being elements of which the action can only be determined empirically. Only general indications can be given on this point, starting with the fact that the accuracy of the present pieces is comparable with that of the aim, and hence quite sufficient. Accuracy may therefore be dismissed as one of the elements of the study.

Furthermore, the reader of German technical works and articles always runs the risk of being led to attach too great importance to this question. The Krupp and Gruson factories are in the habit of dwelling strongly on the accuracy of their pieces in the reports of experiments which they send to the papers, and which the latter eagerly publish. Now the misses given out, or to use the expression adopted across the Rhine, the rectangles of 50% of the shots are measured by groups of rarely more than five. In other words such data are of almost no value.

8. On the other hand the initial velocity has not the exclusive importance usually assigned it. It is undoubtedly what the constructor has mainly in sight, since it is that which affects the matériel by the strains which it throws upon it; but so soon as this matériel has been perfected to resist these strains the fighter becomes perfectly indifferent about the matter. What the fighter demands is that the projectile shall retain a good velocity to the extreme limits of its practical range. It is in fact the remaining velocity, when considerable, which enables us to make one shrapnel more effective than another, for equal weights, by increasing the number of bullets and reducing their size, for the remaining velocity ensures them a sufficient effect notwithstanding their lack of weight.*

The remaining velocity, to be sure, is a function of the initial velocity and the nature of the projectile. But it is not so readily deduced therefrom as is the sectional density from a knowledge of the weight and calibre, and the importance of this function from the standpoint of effectiveness of fire causes it to deserve as careful attention as the initial velocity.

9. Hence it seems that for the list of fundamental elements mentioned above, the following may be substituted:

Weight of the projectile;

Calibre;

Initial velocity;

Remaining velocity (at 4000 or 5000 metres to fix our thoughts);

Mobility of the battery.

Even as it is, this list still presents enough contradictory conditions to furnish material for long discussions; and whatever desire may exist to analyze its terms separately, for greater clearness, that point can never be reached on account of the manner in which they influence each other, the thorough study of one involving that of all the others.

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*We believe that this point, viz., the advantage of as great a remaining velocity as possible, is generally admitted. Its discussion, which will be found in great detail in General Wille's work, would involve long considerations of tactics and fire, which would be wholly outside the scope of this paper.

The present *Notes* are not ambitious of studying the entire programme, the solution of which it would now be possible to ask of constructors. The notes will be limited to discussing the essential points of the programme and solution proposed by General Wille, and to offering occasionally counter propositions.

GENERAL PRINCIPLES OF THE SYSTEM.

I.—*Fundamental principles and numerical data of the Wille project.*

10. These are the terms in which General Wille sums up the programme to which he has set himself: "My propositions tend to establish a field-gun which is essentially, in the indispensable changes near at hand, an enlarged copy of the present infantry rifle, that is, an arm fulfilling the following conditions: Small calibre, great initial velocity, great sectional density, great effectiveness, relatively great lightness, and wholly satisfactory mobility."

This is claiming a great deal at once. But above all, it is starting from a very debatable conception. In fact one can scarcely see what there can be in common between a gun and a musket, except that both are projectile weapons, using a similar propelling agent.

As the *Militär Wochenblatt* has well remarked, this assimilation is the fundamental defect of the work: "If this were justified, the weight of the shell or shrapnel should have fallen from about 7 kg. to 3.5 kg. in the same period which saw the musket-ball reduced from 31 g. to 15 g. Now, we find the exact contrary to be the case, that is an increase in the weight of the artillery projectile, and justly so, for the first condition of a satisfactory effect is that shrapnel should contain a large number of bullets which can only be had with large weight. The start must be made from this weight, in order to deduce therefrom the velocity which present technical means permit of giving to the projectile. The weight of the projectile remains constant, the greater part of its velocity is lost on the way. It is true that an increase of the weight of projectile involves that of the entire system, since experience shows that a certain minimum supply of ammunition must be carried. This is the eternal conflict between power and mobility. Whoever wishes to increase both at the same time will probably accomplish nothing, he will fall between two stools. Our notion is to keep the present mobility and increase the power up to the limit of what is possible." And a little further on the same critic called to mind that Lieutenant-General Müller, now director of the Bureau of Arms in the War Department, in a study entitled: "Development of Field Artillery," wrote this observation: "Immediately after great wars there is always a demand for an increase of power; during long periods of peace, on the contrary, this quality is relegated gradually to the background, and the tendency to increase mobility is seen to arise."

General Wille has not accepted the reasons against his likening the gun to the musket. If the infantry bullet has lost in absolute weight, he says, it must be noticed that it has increased per unit of area of the cross section. In like manner artillery projectiles have lost some of their weight and fallen

from 11 or 12 kg to 7 kg on an average, but they have gained in sectional density.

The *Militär Wochenblatt* has not touched upon this point in its reply, abandoning the field to the General. It is certain that these two facts, diminution of weight and lengthening of projectiles, are correctly stated, but they are not conclusive, and it was easy to reply. A weak point of the project which will be taken up further on is here touched. By virtue of the very assimilation preached in the work, the sectional density, or, what amounts to the same thing, the length of the projectile, should decrease proportionally to the calibre. Now, starting with projectiles of higher calibres, General Wille gives his a greater sectional density, neglecting the increase of pressure which will follow for the gun.

11. Without dwelling on this point for the moment, there remain between the musket and the gun two essential differences, which, in our opinion, forbid any comparison of one with the other.

In the first place, the bullet is only intended to disable one man, and there is nothing to prevent its being made still lighter than it is now, provided that a sufficient velocity be assured to it with the means of preserving this velocity. The same may be said of the bullets in shrapnel. But the gun does not project these bullets directly, as is the case with the musket; the intermediary of the projectile, which acts as a conveyance for them, is used for that purpose; and, when it is a question of preparing this projectile or even a simple torpedo shell, a thousand obstacles are met, which are very likely not all avoided in the project which is under consideration. An endeavor at least will be made to show this.

Again, the flattest possible trajectory is rightly sought for the musket, so as to give a deeper dangerous zone, and to allow firing up to a certain distance without changing the sight. In this order of ideas, the adoption of high initial velocities and of the small calibre marks a great advance; and the ideal would be to find a musket whose bullet would not rise at the outside more than the height of a man.

But these considerations have nothing to do with the gun. Explosive projectiles and time-fuse fire have destroyed interest in them, even to the thought of the dangerous zone; and the enemy's musket has killed short-range fire. Finally within the average distance where cannon is used, the flattest trajectory has a versed-sine measured in hundreds and not in tens. This, moreover, is very fortunate, for the gun should be able to fire over the heads of our own men. Who would dare to use his own artillery against that of the enemy if he had first to make sure that the intervening league were as clear as a drill ground? In a word, if it were possible to build a gun with a trajectory as flat as that of the present rifle, that gun should be set aside without examination.

12. It must be clearly understood that what has just been said is not to be considered as having aught to do with the great controversy between the respective merits of plunging or direct fire. Whether the use of mortars or shell guns be assumed in the future for field warfare, the use of cannon will not be discontinued, and, to all appearances, these last will always be in the

great majority. They alone will be examined in this work, and the points to be developed will be those of construction and not of tactics.

13. Returning to General Wille's programme, it may be qualified by saying that it is out of all reason.

It is certain that, if we take a gun actually existing, each of its parts will be found capable of a certain improvement. To try to obtain all these improvements at once would be a very ambitious task, even supposing them to be wholly independent of each other; but to try to push each one of them way ahead of what has been done up to the present time is, surely, to attempt the impossible.

It is easy to reply to those who dissent: "We have been already many times at the so-called limit of the possible,—only to cross it very soon afterward. * * * Each time that a smaller calibre or some other improvement has been adopted, it had been previously declared impossible to go further. * * * Such has always been, and doubtless will always be the natural course of events. I am willing to grant to the gun of him who dissents from my views the title of cannon of the present. But for my own, which, I have good reason for believing, can be made, I keep the title of cannon of the future. And the future will show which of us twain be right."

Far from us be the thought of thus placing limits to progress; besides, none of the critics whom the general answers thus has done so. The only question for us to know is what is the future in question? for in preparations for war as for industry, a space of a few years is already a distant future; according to the *Wochenblatt's* original way of putting it, it is useless "to break our children's heads about it" or "to try to leave to posterity a will which cannot be attacked." And just because the proposed system is specious and seductive at first glance, we think that we shall have accomplished a useful task, if we succeed in showing that there will be required a total of improvements which is not likely to be realized in the step which armament will probably make before long; and it is really not yet time to think about the one which comes after.

14. Be that as it may, here are the principal numerical data of the matériel proposed by General Wille:

Gun, carriage, limber and caisson, of a single model for all batteries.
Calibre 7c.
Total length of the gun: 2m. 80 (40 calibres).
Weight of the gun, including breech closing part: 400 kg.
Projectile: Torpedo shells and shrapnel, with double-acting fuse.
Weight of projectiles: 6.5 kg.
Weight of charge: about 1.5 kg of Nobel powder.
Weight of cartridge complete 8.5 kg.
Initial velocity: at least 800 metres.
Weight of carriage, with accessories: 550 kg.
Weight of limber, with 30 rounds: 800 to 850 kg.
Weight of the piece limbered up: 1750 to 1800 kg.
Weight of the caisson body carrying 42 rounds; 900 kg.
Weight of caisson limbered up, carrying 72 rounds: 1700 to 1750 kg.

[The limbers of *horse batteries* only carry 24 rounds, and consequently are 50 kg lighter, in round numbers: hence for these batteries we have:

Weight of the piece limbered up (24 rounds): from 1700 to 1750 kg.

Weight of the caisson limbered up (66 rounds): from 1650 to 1700 kg.]

Composition of all batteries: 6 pieces, 9 caissons, 3 supply wagons, no forge, total: 18 carriages.

Number of rounds.	Mounted battery.	In all:	828.
		Per piece:	138.
	Horse battery.	In all:	738.
		Per piece:	123.

II.—*Weight of the projectile, initial velocity and effectiveness, calibre.*

15. Before studying in detail the determination of the weight of the projectile, its initial velocity and its calibre, it is well to glance at all these elements at the same time, so as to examine their action on each other.

A cannon of a given weight is a machine capable of supplying a certain amount of useful work, in the shape of living force communicated to the projectile. This quantity is determined by the maximum pressure which the gun can resist, that is, after all is said, by the state of science and industry at the period under consideration.

In this respect, there exists a convenient criterion of the relative values of two pieces, *everything else besides being equal.* It is the ratio of their useful work to their weight, or the living force of the projectile per kilogramme of the gun, or, in other words, the *effectiveness of the piece.* This term of comparison, more frequently used in Germany than with us, may be useful but on condition that all the conditions of the problem are justly weighed, and that we be not led astray by apparent advantages which may give rise to still greater disadvantages.

In fact, to judge by the comparative tables published from time to time, it would appear that nothing more is to be said when one gun shows a higher effectiveness than another. But here happens the same thing which occurs in all questions of artillery. To consider only one element of a problem, or to give it a preponderating influence, is to run the risk of going astray. It may very well happen that an effectiveness is too great; that is especially liable to be the case when it is a question of a field gun; every one knows how far the science of the carriage is behind that of the gun. It has been possible for a long time to make guns which, while they do not attain the effectiveness of the Wille gun, are so effective as to break any carriages on which they have been mounted; hence it has been necessary to keep within more narrow limits lest there might be lost in the weight of the carriage all, and even more, that has been gained in the weight of the piece. If then a certain effectiveness must be had, it is not that of the gun alone which must be calculated, but that of the gun mounted on its carriage,* which we

* The same consideration is applied to other pieces than field guns; there are ship guns made intentionally heavier at the breech than their strength required, for service reasons tending to diminish the space protected by the mask and turret; whence, after all, a reduction of the total weight of the piece and its protecting apparatus. If then the effectiveness of the gun alone be considered we run up against a real deception.

The same may be said of the effectiveness per kilogramme of powder, which, in the reports of

shall call the *effectiveness of the piece in battery*. In like manner, to study mobility, it will be interesting to consider the living force of the gun on a carriage and limber loaded as for war, or *effectiveness of the piece limbered up*.

For the time being, it will be enough to say that in the matter of durability, the effectiveness given to the Wille gun is out of proportion with what can be had from modern metallurgy and explosives. As for the carriage it would be put to a very harsh test.

16. Be that as it may, let us assume that the weight of the gun to be made has been settled. This, for the field gun, follows from its conditions of service and mobility. Hence its strength, and consequently its effectiveness also are determined by the present state of industry.

The weight of the projectile lies between two limits, one being the lowest assumed for effectiveness while the other follows from the least number of rounds which we may wish to have carried by the battery. But, this weight and the initial velocity are connected by a very simple condition, namely, that the living force obtained by their combination shall not exceed what can be required of the gun.

Hence, in these two quantities, one may hesitate very legitimately between an infinite number of pairs of values which answer to this condition, and ask whether as a matter of principle it be better to obtain this living force by increasing the initial velocity at the expense of the weight, or *vice versa*. Moreover, it is well to mention now that this choice is of capital importance; for to a change in velocity which, by itself, is of no moment one way or the other, there corresponds, for the projectile, a relatively great change of weight which will exert a considerable influence on the preservation of its velocity, or its internal organization and, consequently, on its effectiveness.

Here then is material for interminable theoretical discussions, and it is impracticable to repeat all the arguments which have been exchanged in favor of the one or other solution, and which are already well known to almost every one.

17. This is because the problem, which was relatively simple in the time of special projectiles, has been singularly complicated by the invention of oblong projectiles. Indeed it is not sufficient to have the weight and initial velocity of the latter given; a calibre must also be chosen, a new element which has a direct bearing on the internal pressure and, indirectly, a new influence on the initial velocity.

It has already been remarked that. if the initial velocity is of prime importance for the maker, it is not so for the artillerist. Initial velocity for him is a means and not an end. The end is the remaining velocity at fighting distances. Now, to have great remaining velocity there must needs be

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German experiments, invariably accompanies that of the piece; it is clear that this means nothing unless applied to similar pieces using the same powder. A siege gun which must not be too heavy, or a fortress turret gun which, on account of its emplacement being fixed, must project the least possible, will be shorter than ship guns of the same calibre. Hence to obtain corresponding velocities the charge of powder must be greatly increased. Is it fair, then, to compare the living force per kilogramme of powder given by these guns with that of others where the charge can be better utilized?

a high initial velocity; but the latter must not be too great, else would it be lost on the road, the resistance of the air increasing much more rapidly than the velocity, and an increase of the initial velocity implies, for equal living force, a lighter projectile.

The answer given to this objection is, it is true, that the preservation of the velocity may be assured by increasing the sectional density. In other words, the weight of the projectile being fixed its calibre will be diminished. The unfortunate part of this is that, if this line be followed too far, the internal pressure increases beyond all reason, as will be seen in speaking of the determination of the calibre.

Thus, to sum up, a great remaining velocity is the thing sought. In order to obtain it one is first tempted to force the initial velocity, by reducing the projectile to the strict minimum of weight which is considered effective. But then, in order that this velocity be not lost very rapidly the calibre must be reduced, and very soon one brings up against high pressures and difficulties of arrangement of the projectile. Hence the obligation of limiting the search for initial velocity; and one returns to a projectile slightly heavier and of a less reduced calibre which will better preserve the given velocity, and consequently will be more powerful for a double reason. With the same stroke the reactions on the matériel are reduced and the latter may be lightened.

(*To be continued.*)

ON THE CARE OF THE ORGANS OF SPEECH.

Prepared for Military Officers By Dr. Nitsche.

From the German.

By CAPTAIN MAX WESENDORFF, U. S. A.

A SONOROUS, powerful, far-reaching voice in commanding is of such apparent and even moral significance—not only for the troops themselves but for the commanding officer that it seems hardly necessary to waste words over it. But no officer is likely to appreciate the value of adequate, enduring organs of speech better than he who at one time possessed a well-sounding voice and having sooner or later lost it, now experiences with regret how his voice, after but few commands becomes hoarse, how it requires greater and greater exertions to be audible and finally fails altogether. It does not afford sufficient comfort to accept the hoarseness with all its attendant unpleasant features as the consequence of the demands of one's calling, and in addition this comfort generally issues from incorrect presuppositions. The writer of this has had sufficient opportunity to convince himself that in the case of most persons, who in their calling must use their voice much—especially in the case of military officers—the chief cause of lost or decreased means of speech is only too often to be found solely in the neglect of diseased conditions or the incorrect use of the organs

of speech. It appears, therefore, not unimportant here to set forth briefly—for the benefit of military officers—the conditions and means by which the voice can be preserved sonorous, sufficient and enduring even under the greatest demands of their calling.

A little excursion into the field of the physiology of the voice is indispensable to this purpose. In speaking the lungs, the larynx and all parts of the mouth and throat are active. With the lungs we inhale and exhale the air. The stream of air exhaled, which carries out of the body the useless carbonated air, is at the same time the impelling power, which produces in the cavity of the mouth and throat sounds and noises—vowels and consonants.

The air emitted from the throat and bronchial tubes passes lastly through the trachea, an elastic tube of thumb's thickness, which reaches about midway up the throat, where the larynx that can be felt from the outside ends it. The larynx is a round cavity formed by several cartilaginous tissues; in it are stretched horizontally the two vocal chords, white tendinous elastic formations, interwoven by muscular fibres. The front ends of these are fastened immovably in the larynx, while the rear ends are movable. If we breathe quietly these rear ends of the vocal chords spread out—away from each other, producing between them a triangular opening—the glottis. If we speak or sing the two vocal chords jump close together, so that only a narrow space, like a line, remains open between them and they fill the larynx like a horizontally stretched skin with a fine cleft in the middle. The vocal chords then may be closed and opened, but they may also be shortened or lengthened and stretched with more or less tension by the action of other muscles. Now if in exhaling the stream of air with the pressure of the action of the exhalation strikes the vocal chords, which with the exception of the narrow cleft are closed, then it forces its way through this aperture and thereby causes the vibration of the chords, these vibrations are then communicated to the column of air above and thus a sound is produced. The larynx then is the instrument, which brings forth sound. The tighter the vocal chords are stretched, the more vibration follows and the higher is the sound; and the stronger the pressure of air from below the more powerful is the sound. But its individual and characteristic timbre the sound receives only from the consonant vibrations of the air in the cavity of the mouth and throat above the larynx, in which cavity are formed at the same time the elements of speech—vowels and consonants. A look into the open mouth enables us to recognize which organs are hereby chiefly active. At the bottom of the cavity of the mouth lies the tongue, opposite to it is arched the hard bony palate, to which again is attached the soft movable palate. This latter terminates in the uvula and both together end in two foldy tissues—the palate folds—leading to the tongue and the lower cavity of the throat. In each of these folds is imbedded a tonsil. Beyond the uvula we see next an empty cavity and then the further wall of the throat. Through the various simultaneous movements of the lower jaw, the lips, the tongue and the soft palate, which latter when we are quietly breathing hangs down into the mouth, but when speaking can rise to the nose, completely closing the air passage, the cavity of the mouth and throat—being in fact but a tube open in front—assumes very different shapes. If, therefore, emitted air passes

through this cavity while the glottis is open various vowels are heard in whispered tones in accordance with the variously formed shape of the said cavity. A vowel then is the peculiar sound of the characteristically formed cavity of the mouth and throat and is made audible by the simultaneous vibration of the vocal chords. The consonants are—in contradistinction to this—noises produced in various parts of the mouth and throat cavity, *i. e.*, between the lips, between the points of the tongue and the teeth, between the upper part of the tongue and the soft palate, etc., and also by the stream of air emitted.

In the production of each word then, which we speak, are simultaneously active: the muscles of the lung cavity to produce the flow of air emitted, the muscles of the larynx to close and give tension to the vocal chords, and the very complicated muscular machinery of the mouth and throat to assume in rapid succession the positions necessary for the formation of vowels and consonants.

It would seem a well-justified demand that a mechanism so wonderfully constructed needs also special attention and care.

Now if the lungs are healthy, the vocal chords elastic and nimble, the cavity of the mouth unobstructed, its organs ready, and if all the muscles in speaking work together evenly and simultaneously in mutually well proportioned and graduated unfolding of power—then the voice must be sonorous and beautiful, sounding forth audibly and plainly to considerable distance, and it will then be able to withstand all exertions. But if on the contrary the voice sounds coarse, hoarse and tired and fails easily, then—presumed that the lungs are healthy—either the vocal chords are rendered thick, unelastic and partially lame by acute or chronic diseased conditions, or the cavity of the mouth is obstructed and its motions impeded by a swelling of the tonsils, or chronic swellings of the membranes of the throat and other diseases; or finally individual parts of the muscular apparatus of the voice, especially the vocal chords may be weakened, perhaps even paralyzed —though the organs may be in themselves healthy—by an imperfect mode of speech, excessive hollowing, forced talking in too high or too low a key and the like.

If therefore the voice is to remain loud, euphonious and powerful even under great exertions, then the organs must *first* be healthy to start with, *secondly* they must be protected against acute inflammations to the best of one's ability, and *thirdly* they must be used correctly and properly, *i. e.*, one must speak in proper manner.

Concerning the first point, that the organs of speech must be healthy before they are subjected to great professional strains, as in the case of military officers, the demand seems but self-evident and natural and yet it is very much sinned against. But a heavy, nasal unclear speech is not looked upon as a disease, it causes no pain, the "getting used to it" lets one gradually overhear all that is unpleasant, inæsthetic and unnatural about it, and the awkward badly-sounding speech is simply endured as an inherited fault of nature. But the causes of it are in most cases the above mentioned diseases of the throat and further very frequently the chronic swellings of the membranes of the nose or tumorous growths in that organ and its cavity,

which generally exist from childhood up and are not only an impediment to the capacity of speech in itself, but also hinder the larynx in its movements inducing it to excessive exertions, which in occasional professional work may lead to chronic hoarseness. But these very frequently inherited diseased conditions of the throat and the nose are at the same time the chief cause of additional acute inflammations. The so-called "being subject to sore throat," which at first produces temporary, but through repeated attacks lasting disturbances of speech, is generally due to a diseased swelled condition of the tonsils, which frequently are perforated and furrowed and by this condition offer a welcome soil to germs of inflammation. But the frequency of sore throat may also be owing to the habit of breathing through the mouth, having become necessary by the "stopping up" of the nose, or the cavity of the nose and throat. Our nose is peculiarly constructed and is lined on the inside by a characteristic membrane, so that the air inhaled through that organ is not only freed from the particles of dust and the bacteriæ it contains, but is also evenly warmed and moistened and is thus enabled to reach the air passages in perfectly appropriate and wholesome condition at any season of the year. Of this important advantage he deprives himself who breathes through his mouth; in this case the air with all its dangerous ingredients passes—cold or dry—through the mouth and throat directly to the larynx and thus produces diseases that might have been avoided. This injurious breathing through the mouth never arises—as is erroneously supposed—from a blamable habit merely, but exclusively from the impossibility to breath through the natural passage, the nose, and habit plays a part in it only in as far as the possessors of "stopped up" noses are in most cases not even conscions of the defect.

Most of the diseases mentioned are at the present state of science curable in simple, undangerous and painless manner, and I—like every other specialist—could mention numerous cases, especially of officers in which—aside from the renewed sense of health—the coarse, fatigued voice became lighter and freer again and gradually recovered its sonorous qualities and where the dreaded and expected inflammations of the throat did not reappear, and this all simply in consequence of the restoration of the unhindered breathing through the nose by the operation of the swollen tonsils or the burning of the chronically constipated membranes of the throat. These conditions must therefore receive as early as possible active attention and appropriate medical treatment. But if under otherwise healthful conditions acute diseases, especially catarrhs of the throat and larynx still make their appearance they too require the most extremely careful conduct and above all—in addition to suitable medical treatment—the greatest possible rest of the organs by silence. A non-use of the inflamed vocal chords for several days often brings about complete cure, whilst the continued use of speech, the unceasing exertion of the already sick tender organs may often lead to chronic disturbances of the gift of the voice.

Notwithstanding the comparative frequency of the described conditions which endanger the voice, I would yet assume that among the officers, who have cause to complain of their organs of speech, a greater portion have come to the disturbing hoarseness or weakness of the voice-power through

a faulty use of their organs in speaking, especially in commanding, while these organs were originally perfectly healthy. Although quite peculiar demands are made upon the throat in commanding, the loud ejection of orders, which exacts force, yet a large number of rules that apply in other professions, requiring loud and continuous speaking, can not only be made valuable but are of great importance.

The secret of speaking correctly, which even in the utmost use of the organs of speech, yet has for its object their greatest possible saving and care is based, as was already said, upon the simultaneous harmonious action of all the muscles, by which are produced the breathing and the formation of sound to the production of the specific vowels and consonants. We know that the volume of the sound is dependent upon the force, with which we eject the air from the lungs. If therefore during the act of speaking or calling the amount of air in the lungs is no longer sufficient to produce the intended and required volume of sound, then the muscles of the larynx are strained beyond their capacity to replace the lacking force of the voice by artificially raising it. Or if—to use another example—the speaking is done carelessly with imperfect articulation, if—even in commanding—the lips are scarcely moved and the voice comes dull from the depths of the chest, then again the lungs and the larynx are forcibly taxed to supply the want in articulation by an undue strength of sound. In faulty breathing then and in defective articulation, the larynx with the muscles of the vocal chords are overtaxed until they become unable to perform their functions. It would therefore seem advisable to heed the following points in commanding: 1. In *breathing* it should be the main concern of the commanding officer that he has under all circumstances a sufficient supply of air in his lungs that he may be able to produce the required strength of sound simply by vigorous expiration without the aid of other means. *This makes it necessary to take a deep breath before giving an order, and the amount of air thus provided should never be emitted completely and never all at once, or by puffs;* it should be carefully husbanded and a certain amount of air should always be reserved in the lungs, the chest being kept fairly raised. Only in this way can the irregular and injurious mode of inhalation while giving a single order be avoided.

2. In respect to the *formation of the single sound,* and *the pitch of it,* let it be said that every man has a mean height of voice born with him, which requires the individually least tension, and therefore the least exertion of force on the part of the muscles of the larynx. The speaking in this individual pitch then naturally taxes the larynx least, while continuous talking in too high or too low a tone of voice, is attended by an injurious overexertion. But in commanding it is required that the order should be called out in a *high pitch, i. e.,* in higher sounds than in common speaking, demanded by the necessary strength of voice. Yet the required and suitable pitch in commanding is again individually different, and is regulated by the demands of the occasion according to the distance and the size of the military bodies commanded. To issue orders with a relatively low voice is decidedly to be condemned, but the required and adequate pitch of voice must be carefully sought for and tried. In this practice the rule should be applied that every

word of command must be actually spoken, that therefore orders should be given only in that pitch of voice in which vowels and consonants can yet be uttered sharply and distinctly.

3. This last mentioned well articulated and full pronunciation of the vowels and consonants falls, as we know, to the muscles of the mouth and throat, and is of the utmost importance in speaking. Every drill-ground furnishes instructive material in this direction to the attentive listener. One gentleman is heard to give his orders without exertion sharp and far reaching, with clear and precise articulation, while of the command of the other, though hallooed out in a loud voice, scarcely a few vowels are heard, and consonants either not at all, or the one or other too predominantly; whole syllables, especially final syllables, are often entirely lost. (Right shoulder arms! sounds like, right shoo-ah; Attention! like, t'on; Forward. march! like, fo-rd mah)! How faulty and injurious this mode of commanding is, is sufficiently shown by the foregoing reflections, and we derive from them also the very important rule to enunciate in commanding every *consonant and every* vowel actually *plainly* and *strong*. Whoever gives his commands in this manner can be well understood at considerable distance without a special consumption of lung power, he cannot halloo at all, nor can he speak in too deep a tone of voice, but he must confine himself to that height of tone corresponding to his voice. But through the fact that lips, tongue and palate take upon themselves the main portion of the work in the use of the voice, the larynx too can unfold its activity free and unrestrained, and it thus remains fit for use and the voice full and clear in spite of all demands upon them.

I am certain that many of my honored readers, thinking of situations when one command must follow the other with the swiftness of lightning, will simply declare this latter requisition impossible and impracticable. And yet it is not an imaginary one. A mode of speech as that described is easily attainable to the advantage of all the organs of speech, but as a matter of course *only by practice*. What an agility do the muscles of the arms and legs and the whole body attain by systematic gymnastic exercise and drill! Why then should not the muscles of the mouth, the lips, the tongue, be also susceptible of being trained up to increased capacity in use.

It would be pleasing to me if, by the foregoing treatise, some interest had been awakened in this important care of the organs of speech on part of military officers. In this case an additional blessing could also be secured for the young men in the military academies, or perhaps for the non-commissioned officers too, by an application of the principles set forth.

THE SHOEING OF ARMY HORSES, ANCIENT AND MODERN.

By GEORGE FLEMING, C. B.

(*From the United Service Magazine, London.*)

THE horse is valuable to man because of its strength, speed, and endurance, to say nothing of its intelligence and docility. But these qualities would be of little importance were its hoofs not protected by some contrivance that would shield them from the effects of prolonged travelling, especially on hard ground. No other creature has so powerfully assisted in the progress of civilization, and it has been able to do so because at least two thousand years ago it was discovered that the hoofs could be rendered proof against injury by the simple expedient of attaching a narrow rim of metal to their ground margin by means of a few nails. Until this armature was adopted the horse was of little value, as a few days' travel with a load on its back, and particularly during wet weather in stony countries, would soon render it foot-sore—a condition which would require a considerable time to recover from. So that until this protective shield for the hoofs was introduced the horse was comparatively disregarded, and held a far inferior position in the estimation of mankind to that which it afterwards did. Some of the nations of antiquity preferred the mule or ass, from the superior endurance of their hoofs, while others utilized the camel—in every case the animal being selected for its physical adaptation to the soil and climate, and the particular kind of labor demanded.

Thus, previous to the discovery of horseshoes to guard its feet from injury, the horse must have been almost useless, if not an encumbrance, in rocky, mountainous countries. This reason, in all probability, induced Moses to forbid the use of the horse among the people of Judea, and may account for its not being mentioned in the Decalogue, though the ox and ass are. Amos (vi. 12) speaks of it as a thing as impracticable to make horses run upon a hard rock, as to plough up the same rock with oxen. "Shall horses run upon the rock?" Something similar may be gleaned from a passage in Judges (v. 22): "Then were the horses' hoofs broken by means of the prancings, the prancings of the mighty ones." And ancient history otherwise makes frequent mention of damage done to horses' feet through their being too much worn by travelling. One marked instance is given by Polybius, who informs us that the horses of Hannibal's army suffered much from the loss of their hoofs in Etruria.

It is curious and instructive even now to observe, wherever the horse is employed with unshod feet, the diminished sphere of its usefulness. On the great alluvial plains or pampas of South America, where horses cost less than shoes for their feet do, they are consequently ridden without them, and generally suffer but little. But if any travelling has to be done in the Andes, they quickly become tender-footed, and soon are unable to walk. It is the same in South Africa, where horses can be used to a considerable extent on soft ground without shoes; though the Boers would prefer having them

shod if they had the opportunity. For instance, Veterinary Lieutenant-Colonel Duck, who has had a very extensive experience in South Africa, states: "For army horses it is always advisable to have them shod on the hind as well as on the fore-feet. In the Sekukuni war we found this to be absolutely necessary. The colonial horses never in their lives had shoes on their hind feet. Many of them, twelve or fourteen years old, would come back from a long patrol over hard ground as tender in their feet as possible. The hind feet presented the appearance of having been rasped, almost ground away, and blood coming through in spots, both at the frog and at the toe." On the alluvial plains of India, horses can also perform a certain amount of travelling with unshod hoofs, but shoeing is always had recourse to when the work is at all hard. Cavalry horses must be shod on the fore-feet at least, and artillery draught horses on the hind ones.

In pre-shoeing times cavalry must have been of very limited use, and it is highly probable that a large proportion of spare horses accompanied that arm, to take the places of those that were disabled by being hoof-worn. This is what travellers have to do at the present day when travelling in Mongolia. Therefore, the greatest attention was paid to the hoofs, both in selecting and managing horses, dense tough horn being a most important *desideratum;* and the care of the horsemen was to maintain them in that condition. Convincing proof of this is given by Xenophon in his "Hipparchicus." There is also evidence that temporary contrivances were in use at a later period to prevent undue wear of the hoofs, or to enable the crippled horses to get along when the damage had been done. These are described in the early Roman treatises as the *solea ferrea* and *solea spartea*, and other names. In 1860 the Japanese knew nothing of our method of shoeing, and employed similar contrivances in the form of sandals made of rice straw, and if a long journey was to be undertaken, a proportionate bundle of these was tied to the saddle, to be attached to the feet when the hoofs became much worn. Captain S. Osborne saw these sandals made of silk and cotton. In Iceland horses are occasionally shod by the peasants with sheep's horn. In the valley of the Upper Oxus, towards Badakshan, according to Burns, the horses are shod with the antlers of the mountain deer, the shoes being fastened on with horn pins; and, according to Wood, the Kirghiz also shoe the fore-feet of their ponies with horns of the mountain flocks. In the Soudan, when iron shoes cannot be procured, socks of camel skin are employed. In all these countries hard, dense hoofs are essential, and everything is done to render them so, as in the time of Xenophon. Among the Afghan tribes, for instance, not satisfied with the natural qualities of the horn, even when best developed, the native shoers adopt the following means for increasing its resisting power. After removing the old shoe and cutting away enough of the superfluous horn, the lower margin of the wall and the sole are pretty freely charred by a red-hot iron, and while they are yet in a state of partial fusion the entire foot is dipped into a strong solution of alum. Hoofs as hard as flint formed one of the attributes of a useful horse; and Isaiah in the grand prophetic language in which he foreshadows the downfall of Jerusalem, speaks of those "whose arrows are sharp and all their bows bent, *their horses' hoofs shall be counted like flint*, and their wheels like a whirlwind."

It is probable that the present method of protecting horses' hoofs was employed before our era, and was not known to, or at any rate not much in vogue with, the Romans until later. It was also probably introduced by the barbarian invaders, and there is reason to think that the Celts were the first to resort to it in Europe. At any rate, bronze and iron shoes and nails, as well as shoer's tools, are found in the multitudinous graves of the Celtic Gauls in the vicinity of Alesia, where the fate of Gaul was decided by the capture of that immense fortress by Cæsar, which perhaps constitutes his greatest military achievement. Elsewhere they were found in France with Gaulish relics, as well as with Roman remains, and in the early centuries of our era we find allusions to shoeing by various Roman writers. Haydn's "Dictionary of Dates" asserts that shoeing was introduced into England by William the Conqueror, but such was not the case, as some excellent and characteristic examples of the Celtic or Gaulish horseshoes and nails have been found in various parts of this country, some of them with Roman articles; while the laws of Howel the Good of Wales, enacted centuries before the arrival of the Normans, as well as other documentary evidence, testify that shoeing was regularly practised, and that the Court smith enjoyed notable privileges. But at the time of William the Conqueror, and for some centuries afterwards, when heavy armor for man and horse was worn, and the steeds had to be nearly as massive as the van-horses of the present day, in order to be able to carry the immense loads placed on their back, the shoer's art was held in high esteem, as it was of great importance. William brought with him a nobleman, Henry de Ferrers, who received the surname because he was entrusted with the shoeing of the King's horses; and the present Ferrers family still bear six horseshoes on their coat of arms.

The designation of "mareschal" (origin of the title of marshal) was in everyday use at this time, and a price was fixed by regulation for shoeing. Shoes appear on seals, and on the arms of towns—as Northampton and Gloucester—and nobles had their mareschals, as they had their squires and other followers. What has been termed the age of chivalry would never have occurred had shoeing not been practised, and so essential was it considered, that knights and squires, and even princes and kings, did not disdain to learn the art. Shakespeare makes allusion to this in one of his plays, where one of his characters, speaking of another, says: "He doth nothing but talk of his horse; and makes it a great appropriation to his own good parts that he can shoe him himself." The squire of the poor knight who could not afford to keep up a full retinue was obliged to perform the duties of several, and shoeing was one of these.

For some considerable time the draught horse (*equus ad tractandum* or *carrectarum*) was a somewhat rare animal, the state of the roads in this country seldom allowing the passage of wheeled carriages. The Court travelled on horseback, the ladies even being compelled to resort to this mode of conveyance. The *equus dextrarius*, or war-horse, was in high favor, and kept only for state occasions or for battle; while the *discopertus*, or "hobelar," was used for quick travelling. The light cavalry soldiers who rode these small horses or "hobbies," were also called "hobelars." All were regularly shod, and it would appear that the shoes and nails could be pur-

chased at a certain but fluctuating price. For the war-horse, the shoes were heavy and clumsy, with great heel projections to afford a grip on the ground; but those of the hobelars were light. The nails had very large projecting heads for large and small shoes, in order to ensure a good foothold. This is also a characteristic of the earliest nails discovered.

In the interesting chronicles of Froissart we find many interesting references to shoeing. Describing the first attempted invasion of Scotland by Edward II., he gives us an instance of the importance of the art at that time, and the inconvenience that arises when circumstances prevent its being attended to. When the army of that king had advanced as far as Newcastle-on-Tyne, the cavalry were in a miserable plight, and evidently ineffective. "It never seased to rayne all the hoole weeke, whereby theyre saddels, pannels, and counter-syngles were all rottyn and broke, and most part of their horses hurt on their backs; nor they had not wherewith to shoo them that were unshodde."

When the troops reached Durham, however, they were obliged to rest there for two days, "and the oste rounde about, for they coulde not all lodge within the cite, and theyre horses were newe shoode, and set out on theyre march to York."

In these chronicles—which embrace the latter part of the reign of Edward II., and terminate with the coronation of Henry IV.—there is repeated mention of shoeing, and particularly in dealing with the wars which England was then waging on the Continent. In the great army Edward III. carried into France in 1359—the greatest, according to Froissart, that had ever left England—we find a completeness in equipment and material which is somewhat astonishing, when we hear of the present condition of our Army, and consider its fitness for a Continental war, particularly in the matter of land transport. Our warrior king appears to have omitted nothing that could render failure impossible. On arriving at Calais he "took the field with the largest army and best-appointed train of baggage wagons that had ever quitted England. It was said that there were upwards of 6000 carts and wagons, which had all been brought with him." Describing the order of march, Froissart goes on to state that "in the rear of the King's battalion was the immense baggage-train, which occupied two leagues in length; it consisted of upwards of 5000 carriages, with a sufficiency of horses to carry the provisions for the army, and those utensils *never before accustomed to be carried after an army*—such as hand-mills to grind their corn, ovens to bake their bread, and a variety of other necessary articles. * * * There were also in this army of the King of England 500 pioneers with spades and pickaxes, to level the roads and cut down trees and hedges for the more easy passage of the carriages. * * * I must inform you that the King of England and his rich lords were followed by carts laden with tents, pavilions, mills and forges, to grind their corn and *make shoes for their horses*, and everything of that sort that might be wanting." This appears to have been the first occasion on which field-forges for shoeing horses accompanied an English army in war. No doubt an ample number of shoers was provided. By a statute of this monarch, dated in 1350, it would appear that the shoer was yet designated in Norman-French, still fashionable in legal and Court

language, the *ferrour des chivaux*, and was, with a number of other craftsmen—such as saddlers, spur-makers, armorers, etc.,—regularly sworn in before the justices to do and use his craft in a proper manner, and to confine himself to it.

Through all the subsequent wars the shoeing of army horses demanded attention, and the field-forges were accompaniments of every expedition. The art itself was practised in the army as in civil life; but it descended to a low level, and there were no longer kings and princes, knights and squires, to patronize it; so that its practice was entrusted to men who generally knew little of the principles which should control it, and were, for the most part, mere rule-of-thumb artisans. After the battle of Waterloo, and during the long peace terminating in 1854, we do not hear much of army shoeing; but the many intelligent veterinary officers who served in the interval, and had the superintendence of this section of horse management, prevented the introduction of the malpractices—founded on erroneous notions of the functions of the horse's foot—which had in former times inflicted so much damage.

The farriery organization during the Crimean war was not much tested, as after the army arrived at Sebastopol there was no marching for mounted troops. Balaclava and its vicinity during the siege was for them nothing more than a fixed camp. Each troop of cavalry had a farrier-sergeant, a shoeing-smith, and an assistant; but though the regiments had their full complement on leaving this country, the shoers were soon expended, and as there were no reserves of them in regiments or elsewhere, there was the greatest difficulty in keeping the horses even partially shod. As for the auxiliary mounted corps raised during the war, such as the Land Transport Corps, the scum of the London forges was sent out, along with supplies of iron, coal, and nail rod, to make shoes and nails!

What would have happened had it been necessary to make long marches on hard roads or stony country, it is not difficult to guess; but, fortunately, the test was not applied. A very large quantity of shoes and nails were supplied by different contractors in England; but these were such rubbish, both in material and manufacture, that few were used, and, after the war, they were, I was told, sold for the price of old iron.

Though the shoeing in those days was better in some regiments than others, yet it was not very good on the whole, though the shoers were long-service men. The arrangements for providing the shoeing of mounted corps were highly objectionable. The Government contracted with the shoers to provide all the materials for shoeing at a fixed sum—at first a penny a day per horse, then three farthings, and finally a half-penny. For this sum the farrier-sergeant had to provide iron, coal, nails, and shoeing tools, the Government finding the shoemaking implements. This system led to great abuses, as might have been anticipated, and certainly was not advantageous to the army, however much it may have been so to the artisans, and formed an exception to that prevailing in every other branch of handicraft. However, during peace and long service matters went on after a fashion, though there was always dissatisfaction among the shoers of the heavy horses, who received no more money than those who shod light horses.

It was thought that this contract system would prove more economical than the one formerly existing, in which the shoeing materials were provided by the Government; but though waste was got rid of, and some small economy may have been effected, yet, as I have said, it was rather a one-sided bargain, and not to the advantage of the mounted troops.

The shoeing arrangements were otherwise very defective, and not at all adapted to war requirements. With much difficulty men were obtained from troops for instruction in the forge, and when there, the instruction was greatly protracted, owing to their having to attend drills and field-days, in some regiments stable and other duties. The course of instruction embraced, not only taking off shoes, repairing the hoofs, and applying the new shoes, but also making shoes and nails; so that generally a period of about three years was required to make a fairly intelligent man a good shoer; some men needed a longer time, and some, again, were never anything but indifferent artificers. The shoe and nail making occupied by far the largest portion of this teaching, and was a constant cause of trouble. It needs much skill and practice to forge a good shoe, and exceptional ability to make safe and reliable nails. In only too many regiments this instruction received little consideration, and the veterinary officers had to contend with serious obstacles in keeping the horses fit for duty in the matter of shoeing. Sometimes the men under instruction were constantly changed, or allowed in the forge only now and again, and for brief periods. The sergeant-farriers and shoeing-smiths also sometimes saw an advantage in keeping these men back, and having no spare shoers in the regiment, as then, in case of misbehavior, they could not be dismissed the forge, there being none to take their place.

The shoe and nail making was certainly the greatest drawback to the system, because of the skill and time required to shoe the horse. To make the shoes and nails for a horse, and to put them on, required about two or three hours, and if the animal was a large one—as in transport or artillery—the labor was somewhat heavy. So that to keep forty horses new shod once a month required two or three men. This was during the long service system.

The introduction of short service rendered shoeing a very serious matter, as three years could not be afforded for instruction, nor yet one-third of that time—there being scarcely opportunity to train men as soldiers, much less artisans also—before they were eligible for the Reserves. The shoeing in some regiments was in a lamentable condition, especially in those recently returned from India. Nail-making, the most difficult part of shoeing perhaps, had to be given up; a few being made, or attempted to be made, in some regiments just for practice, those for attaching the shoes being purchased; while, as a rule, the shoes made were of a very sorry description, and the reverse of uniform. In the majority there was not a spare shoer, and in very few were there men under instruction.

The expedition to Egypt in 1882 brought this unfortunate state of affairs markedly to notice, especially in the case of one cavalry regiment, which embarked with its full complement of shoers, but no extra ones. On reaching Cairo the number of these had become so reduced that the horses could

not be shod: no shoers could be spared from the other corps, shoers were telegraphed for from England, but regiments were nearly as badly off at home.

This unsatisfactory state of the army shoeing demanded immediate attention, as it was rendered evident that our mounted corps were scarcely fit to enter on a campaign of such a trifling character as that in Egypt, where there was scarcely any marching.

The defects of the system had long been apparent to those who were responsible for the shoeing of army horses, but the advent of short service accentuated these a thousand-fold, and while during peace it was scarcely possible to march troop horses from one station to another, in a campaign of a few days' duration it broke down altogether.

Fortunately, for some years mechanical ingenuity in the United States had been at work devising machinery for the manufacture of horseshoes and nails, and had succeeded in producing these of such excellent shape and quality that those made even by the best workmen could not compete with them; while they could be furnished ready for immediate use in any quantity and at a lower price than hand-made ones. They were in universal demand throughout the States, and the quantity turned out by the manufacturers was immense. On their being introduced and tested in this country, it was at once perceived by those who had studied the subject, that they were a vast improvement on what we had been accustomed to see in the shoeing forges; and as there was no limit to the supply, while uniformity of pattern and quality could always be ensured, a way was opened for getting rid of the grave difficulties attending the shoeing of army horses.

A complete reorganization of the system of shoeing was therefore, proposed—or, rather, a new system was suggested, as the old one, always unsatisfactory, was now obsolete and worthless. The contract between the Government and shoers was to cease; machine-made shoes and nails were to be issued to the mounted corps with which to shoe the horses; a slight reduction was to be made in the established number of shoers on the abolition of shoe and nail making, and a certain percentage of men in the ranks, exclusive of the regular shoers, were to be trained to put on shoes—all that was now necessary to be taught. The shoes were to be fitted to the hoofs in a cold state, instead of hot as in the old system, and everything pertaining to shoeing was to be practised during peace as it should be done in the field—simply, quickly, and efficiently.

The comparatively large number in the ranks trained to shoe would, it was urged, fill vacancies in the shoeing establishment during active service; for it was pointed out that, in cavalry especially, the casualties among the shoers are heavier than among the other men, as they have all the risks and hardships of combatants, in addition to those pertaining to their handicraft.

The absurdity of attempting to teach soldiers to make shoes and nails—even if it were possible to do so with short service—in addition to shoeing the horses, was also strongly dwelt upon; as on an active campaign there is no time for such occupation—to say nothing of the great fatigue and trouble it entails; and owing to the difficulties encountered from weather, locality, and other circumstances, it is often rendered impossible in the open air, when time would otherwise admit of it.

Surely, no one with any knowledge of the subject, or experience of an army in the field, would expect shoes and nails to be made on a campaign. Such a notion can certainly boast of having antiquity in its favor, as we have seen that Edward III. carried field forges with his army when he invaded France, and he also carried flour-mills; probably his tailors and boot makers carried the materials wherewith to clothe and shoe the soldiers; for those were the days when war was leisurely conducted, and there were neither telegraphs, railways, or any other of the numerous appliances which render modern warfare so exacting in point of time and celerity.

Just fancy for a moment what this antiquated and unpractical notion now embraces! A great lumbering field forge, carrying a heavy anvil, sledge-hammers, shoemaking tools, bellows, coal and iron, necessitating two, sometimes four, horses to drag along, encumbering the line of march, delaying movement, and—as in Egypt in 1882—sometimes impossible to drag through sand or mud.

In addition to all this, and without considering the great and useless fatigue imposed upon the men in compelling them to make shoes and nails, the absurdity is greatly magnified on learning that it requires about 15 lbs. of coal and about 6 lbs. of iron to produce a set of shoes that, when ready to be attached to the horse's feet, will weigh only 5 lbs., so that 21 lbs. of materials are dragged along to be manufactured into articles weighing 5 lbs. Nothing need be said as to the nail-rod and tools for nail making; as no one out of Bedlam, we should think, would propose to make these articles on active service, or at any other time, when they can be obtained infinitely better, cheaper, and ready for immediate use.

Instead of two or three hours being spent in shoeing one horse on the old system, a handy shoer can perform the task easier and much better in twenty minutes or half-an-hour with these shoes and nails made by the United Horseshoe and Nail Company.

After much experimenting and consideration, the new system was adopted in a modified form. The shoe and nail making was to be continued to a small extent, three-fourths of the shoes and nails being machine-made and one-third hand made. The opposition to the change was, as might have been anticipated, somewhat considerable. The shoers in many instances, from pecuniary motives, did their utmost to render it a failure, and the unfounded complaints they made were only too often accepted by their commanding officers as substantial. On investigation by those competent to judge, however, the unreality of the complaints was ascertained.

The advantages of the system have been thoroughly demonstrated on many occasions. The shoes are generally so well shaped and finished, and made of such good iron, while the nails are so perfect and easily driven that a moderately expert man might easily keep 150 horses thoroughly shod all the year round, instead of, as in the old system, three men being needed to shoe forty. It allows of a large number of men being trained to shoe; in three years nearly 500 men have been taught this method which is somewhat erroneously designated "cold shoeing." It permits ample time for drill and other regimental duties required of the shoers, and allows of the formation of a staff of competent veterinary hospital assistants for field service.

The embarrassing, unwieldy field forge can be dispensed with, ready-made shoes and nails being carried, instead of the heavy and bulky materials and plant wherewith to make them. The machine-made shoes can be altered in shape without heating them, so that if a forge is at all necessary it need only be a pack-saddle one.

Another advantage must not be overlooked. In issuing these shoes and nails constantly at home during peace, the Army Store Department is gaining experience of their issue in the field—a matter of no small importance when it is considered what inconvenience and delay would be caused by mounted corps having wrong sizes or kinds of shoes served out to them, while the patterns and quality will be always under trial and observation.

The home trials of the shoes and nails, when fairly conducted, have always proved satisfactory, the former being found to wear equally well, weight for weight, with those made by hand. And the trials have been no less successful in the field. In the report of the principal veterinary surgeon with the Suakin Field Force in 1885 is found the following allusion to it:

"The horses and mules were kept fairly well shod up during the campaign, and the shoeing was, on the whole, good. The system of cold-fitting was, on my recommendation, generally adopted, and the new pattern machine-made shoes and nails were used, as far as was practicable, especially among the lighter horses. The superiority of these shoes over those of the old pattern has already been clearly demonstrated by the late experiments in the United Kingdom, but I believe this is their first trial on active service. Their principal advantages appear to be: 1. The ease and celerity with which they can be fitted cold; 2. The superior quality of the iron; 3. Their lightness, durability, and finish; 4. The fact that the heavy field forge, with the fuel and plant for shoemaking, can be dispensed with, the small pack forge being merely necessary in the few instances in which heat is required. The immense advantage of the latter, especially in a campaign in the desert, where wheel transport is impossible, can readily be understood."

And the officer commanding the Inniskilling Dragoons severely tested the system while on active service in Zululand not long ago. He says:

"The regiment having been on field service in Zululand during the last six months, the new regulations as regards cold-shoeing could not be carried out in every particular, though, as far as was practicable and possible, every effort has been made to act on and carry out the instructions issued. Shoeing the horses with cold shoes has been done most fully, and I think very successfully. * * * In a standing camp there can be little difficulty about the details of the system being carried out in their entirety. The material of the shoe is excellent; and if they are gently heated by slight blows from the hammer, they can be opened out or otherwise altered in shape so as to fit the foot without injuring the shoe. The nails are of good quality, well made, and carefully finished. Owing to the regiment being in detachments, and constantly on the move from one place to the other, the horses were all shod with the ready-made shoes and nails supplied for the cold-shoeing, none being shod with the hand-made shoes and nails, as it was an impossibility, under the circumstances, to make them. * * * The shoes and nails are durable and last well. The conditions of service

under which these shoes were used were exceptional, as the troops were on field service during the whole period. The shoes, therefore, were tried under severe conditions, and I consider they bore the trial successfully."

Evidence has been given of the breaking-down of the old system in the Jaika and Galeka and Sekukuni campaigns in South Africa in 1878, as it had done on previous occasions; while the testimony in favor of the new system in the Bechuanaland expedition of 1885, and in the Soudan expeditions, all of which were most exacting tests which the antiquated systems could never have encountered, amply demonstrated its merits. Army horses are infinitely better shod now than they were before the introduction of the system, the shoes themselves being almost perfect in shape, and, in comparison with those previously fabricated wearily and tardily by hand, as Hyperion to a Satyr, while their shape ensures good foothold on the ground and solidity on the hoof. But perhaps the most important of all is the opportunity the system affords of having a good reserve supply of shoers in the ranks to fill up vacancies or supply increased demands during war; this was impossible under the old system, which did not even meet peace requirements under the altered conditions of Army service. The experience of other countries has been similar to our own in this respect. The Germans in 1870–71, notwithstanding their almost perfect organization, which included a larger proportion of shoers than we had in our Army before 1888, complained bitterly and loudly of the inconveniences and evils resulting from an insufficient supply of these artisans; and Ableitner, principal veterinary surgeon of the Bavarian Army, who published his experiences of shoeing during the Franco-German War, asserts that an army on campaign requires treble the number of shoers that it does during peace. The French, fortunately for the Germans, were in no better plight—were perhaps worse in this respect; but in both countries the new English system has attracted attention, and no doubt will be partially or wholly adopted before long. The Swiss, an eminently practical and prescient people, have already adopted it in its entirety, after three years' thorough trial, with the most satisfactory results, as shown by Veterinary Captain Labhardt in his brochure, *La Ferrage a Froid dans l'Armée Suisse* (Berne, 1891). The system of winter-shoeing, also introduced into our Army at the same time as the cold-shoeing, with ready prepared shoes and nails, has been likewise adopted by Switzerland, and is in use every winter. By it every mounted soldier can "rough" his horse's feet without the intervention of the shoer. The urgent necessity for some such simple means is well exemplified in the description of campaigns carried on in northern and western countries during winter, and more particularly in the French retreat from Russia in 1812, the Danish retreat from Schleswig in 1864–65, and the disastrous retreat of Bourbaki's *Corps d'Armée* into Switzerland in 1871. There can be no excuse for such misfortunes in the future, as by a simple and comparatively inexpensive contrivance, mounted troops can be enabled to travel at brief notice, and continuously, on slippery ground with absolute safety, so far as their foothold is concerned.

LETTERS ON INFANTRY.

By PRINCE KRAFT ZU HOHENLOHE-INGELFINGEN.

Translated by 1st Lieut. CARL REICHMAN, 9th Infantry.

XVII.

THE SPIRIT OF THE INFANTRY.

IN the infantry the brigade is the largest unit of troops for which exercises are prescribed in the drill regulations without combination with other branches of the service. It is also the largest unit of infantry, which in war may be called upon to act under a single command and separate from other branches of the service. Therefore I ought to finish with the brigade, if I discourse on infantry, beginning with the smallest units, although I am aware that I have not at all exhausted what might be said of this, the most important of all arms. But I only meant to discuss what has suggested itself to me in the course of time, I did not mean to write about any exhaustive, scientific theory. This is the reason why I have often tormented you with concrete and seemingly trifling details which I however deem important, for of what use is the best constructed tool if not made of good material, of what use is the most beautiful sword, if it is not sharpened or if the edge has become blunted by rust?

Again, of what use is the keenest and best constructed sword, if the arm which is to wield it, does not know how to strike or lacks resolution in striking? Again, of what use are the best institutions in the infantry if the latter is not imbued with the right spirit? I mean the spirit, the true military spirit, not a temporary enthusiasm.

The true soldierly spirit differs essentially from the enthusiasm, which is aroused by the cause of a war. This enthusiasm is noble and elevating, when seizing upon a whole nation. It brings forth great resolves, induces the whole nation to make great sacrifices. How often have we all, before 1870, begrudged our forefathers the enthusiasm of 1813 and longed for such times, and who does not recollect with emotion the grand enthusiasm, which put the whole of Germany in commotion, when in the year of 1870 our most sacred possessions were threatened by sudden danger! How on the banks of the Rhine as well as on those of the Memel suddenly every school and singing society broke out into a song until then unknown, "The Watch on the Rhine!" How the whole German nation rallied like one man around her sovereigns who had but the one aim of defending the fatherland! How associations were formed which collected large sums for the support of the soldiers and the wounded! How the landwehrman and reservists did not wait for the order calling them out, but a large part of them joined the colors before being called out! How the Reichstag voted unanimously (excepting certain great financiers whose greedy hearts were devoted to the Bourse of Paris) whatever the governments of the North German Confederation asked for the expenses of the war, and instead of de-

bating about the amount, answered with an enthusiastic hurrah! That was true enthusiasm; it bore fruit, it achieved great and mighty things and proved a powerful support to the government.

But with those who have to carry on the war this enthusiasm does not last. When long and tedious journeys by rail of twice and thrice twenty-four hours have shaken the body; when, following immediately upon these sleepless nights, fatiguing marches in close columns under a broiling sun have exhausted the bodily strength to the utmost; when days came on which the masses of men lying close together on the high platteau near Metz, could not get a drop of well water and had to use for cooking purposes the offensive water from creeks which had become shallow from the long continued heat, so that, as I witnessed myself, one soldier offered in vain one mark to another for a cupful of such water; when during the battle thousands and thousands, struck down at undreamed of ranges, fell around the man who all day long had not had time to swallow a bit of food; when the as yet unknown mitrailleuse rattled so uncomfortably, then the enthusiasm died out, then the fervor which enkindled this sacred fire, cooled off and was succeeded by the cold soberness, quiet determination, if not by the instinct of self-preservation which by nature is inborn in every man. Then it was only the spirit with which the troops were imbued, not enthusiasm, which held the balance between all disturbing elements; that spirit which outlasts all fatigues, privations and dangers, which animates the body and is one with life, which retains control of the body so long as there is life in it.

But how do we recognize this spirit? how does it show itself? Look at our infantry of 1870–71 and you will know what that spirit is.

"Why the infantry and not the other arms?" you ask. I know very well that the other arms were imbued with exactly the same spirit as the infantry, but their spirit was not put to the test by deadly fatigue to such an extent as that of the infantry. Tney also have an advantage over the modest infantryman from being mounted or belonging to a special arm. He feels himself but an atom in a huge mass and knows that he has been derisively nicknamed "Stubble skipper" or "Food for powder." The right soldierly spirit moreover is much more necessary in the infantry than in the other arms. A skillful cavalry leader may achieve great successes with a mediocre cavalry as did Murat, who knew how to make his cavalry bolt *en masse* at the right time and in the right direction. In the artillery a few reliable men with each gun are sufficient, and those less reliable can at least do their duty. But in the infantry this spirit must imbue all, and every man not imbued with it, is a source of weakness to the whole.

We have heard that "The spirit of the Prussian army is in its officers." Certainly! It is they who in unwearying fulfillment of their duty have trained the private soldier in peace; who have made an efficient soldier, expert in the use of his arms, of the awkward and clumsy farmer or tradesman; who imparted to the crude and uncultivated mind of the private soldier the sense of duty, of honor, of fidelity to the King and Fatherland. It is they who in peace set a good example of Spartan frugality and ceaseless activity coupled with a fine sense of honor and sterling loyalty to their com-

rades. It is they who in skill excel the private soldier in everything, and who in battle set a shining example of fearlessness, and doubly and trebly more than the others, pay their debt of blood, from the general down to the last lieutenant. As General von François, after performing one of the most heroic deeds—the successful assault on the Rother Berg at Spicheren—when struck down by five bullets and dying, said: "It is beautiful to die on the battle-field." General von Raven in 1864 said shortly before his death: "It was time that again a Prussian general should die for his King," so hundreds and thousands of officers of all grades have fallen envied by their comrades, that they should meet with such a glorious fate, a lustrous example to their men. But was that necessary? Would not our men have fought well, if our officers had not sacrificed themselves, suffering a double and treble percentage of losses (of actual strength)? Was there ever heard in the ranks of our infantry a similar word like the well-known one: "Les epaulettes en avant"? Never! I have mentioned before that the troops do not fight so well when without officers, but that is due to the fact, that the men in their character as soldiers feel themselves the work, the creation of the officers, and are accustomed to carry out their will. Hence the words above mentioned, "we did not have any officers to tell us what to do, so we left": But the spirit of the men was the same as that of the officers. They had been imbued with it by the officers and it had taken firm root. "Of course when the lieutenant goes ahead, we must go ahead too," says the soldier. This is the expression of the same spirit, only in a somewhat cruder form, which animates the officers when they carry out implicitly their orders, with deliberation and tactical understanding, but without criticising the order, simply because it has been given. This spirit is the expression of confidence and discipline.

Both are inseparable from each other; for the discipline of our army is no longer that of the past century, when a celebrated authority stated it as a principle, that the soldier should fear the stick more than the bullet. It is no longer based upon the fear of punishment alone, but principally upon confidence in superiors. It is true, the soldier who, as stated in a former letter, joins the troop with such crude, childish ideas of right, duty and honor, that he measures the wrong by the extent of the punishment following it, such a soldier must be kindly, but earnestly educated up to correct ideas of good and bad. Of course there are incorrigible subjects, who put the patience of their superiors to a hard test and make one regret that the stick has been abolished; fortunately, however, such subjects are rare exceptions; all the others accept willingly the education imparted during their three years of active service, and the conviction which they gain, that their superiors are ceaselessly striving to provide for their physical and moral well being, commands their confidence, and thus cements that bond of union which makes it appear impossible to the private soldier, that he can do anything without his officers. In war and battle the soldier is accustomed to see the officer precede him in danger, that is true. But it has also happened that the soldier could not allow the officer to expose himself and begged him to remain back, since he, the soldier, could do the whole business by himself. Many examples of this could be quoted from

the outposts before Paris. I even knew a case where troops felt hurt, because their general had gone to the foremost line right at the beginning and been one of the first in the ranks of the assailants. They said among themselves that it was unnecessary with them, that the generals should place themselves in the foremost rank, that they would do their duty without such example, that this old gentleman, with the white hair and beard, belonged farther back until it was the turn of the last ones; what was to become of themselves if he were killed too soon and there was no one to give the necessary orders?

Every soldier considered as a matter of course, that these orders were the proper ones. No one ever heard any criticism or fault finding. The orders received were taken as fate. "It is so ordered" was ever in our army a magic word. And when half of the men were killed over it, the other half carried out the order. This spirit enabled the supreme command of our army to dispose of the troops as of chessmen. It never happened with us, as it often happened with other armies, that a body of troops was unable to reach its destination. It was ordered and so it was done. You might have seen a strong non-commissioned officer carry two muskets in order that the tired young soldier by his side might be able to keep up, or you might have seen the officer assist in carrying the muskets of the men. In all these duties of course the officers set a shining example. I have known young officers, who having been sent off as orderly officers after a day's march were on the road all night, and returned to the command next morning in time to march with it. They were so tired that they slid off their horses and fell asleep in broad daylight at every short halt on the march. But when their turn came again to carry orders, they were at once wide awake and performed their task. They never made any mistake. I could name you a Staff which I happened to join after it had taken possession of an empty house in the evening after a hard day's work. The rations had not come up, neither bread nor meat was found in the house, only raw eggs and champagne in great quantities. Hungry and thirsty as they were, they all greedily consumed what they found, and even the most moderate ones became totally drunk. In the middle of the night an alarm came and an order to continue the march at once. The orders had to be studied with the map, dispositions had to be made, and the orderly officers had to ride. All were sober at once: none of the dispositions made were faulty, all orders were correctly delivered, nothing was forgotten or neglected. The word "duty" has a magic effect; it sobers, quickens, electrifies. But to preserve this spirit it is necessary that, as is done in our army, the strictest discipline be enforced. Not that discipline which is created by fear of severe punishment or even of the stick, but that discipline, based upon habit, which considers all orders as sacred, which treats the smallest detail with the greatest care; that strict drill-discipline which makes the most absolute correctness of every motion a habit, and which, at present arms, measures the distance of the musket from the pouch with the millimeter measure; that often derided "gaiter button" smartness which becomes enraged over an unbuttoned coat button. This is the discipline that accustoms the soldier to obedience and which must now all the more be inculcated in the infantry since they

will be for the most part broken up into their smallest fractions at the decisive moment. Napoleon III. said at the end of his book: "The Causes of the Capitulation of Sedan," that the Prussian successes were due to the fact, that respect for the government, obedience to the law, and the military and patriotic spirit ruled over all interests and opinions; and a French officer, who surrendered Fort Issy to us in 1871 when he saw a non-commissioned officer make a report in an exact military attitude, said: "Ah, je vois bien pourquoi nous sommes vaincus; c'est par votre discipline. Un de nos soldats, en faisant son rapport, vous aurait fourré sa main sous le nez."

On the other hand the care of the officer for his soldiers, the example he sets in enduring fatigue and danger, creates an attachment for him on the part of the soldier, which has shown itself in a thousand touching ways. Not only does he succor his officer in battle and danger, but when the officer tired to death, sought rest, then the soldiers whenever they could, cared for their officers like a loving mother for her child. Every infantry lieutenant saw probably more instances of this than I, as my rank removed me farther from the men in the campaigns. Still I often saw the same thing—after the battle of St. Privât in 1870, and on many other occasions.

Not only had the men great attachment for their officers, but the confidence of the men in their superiors during the last wars was so great in fact, that they not only felt sure that the orders received were proper and necessary, but also that anything but victory was impossible. This confidence showed itself in 1870 already at the calling out of the landwehrmen and reservists and found a comical expression in the words with which a landwehrman showed to his wife the order calling him out: "Look here," he said. "We have got to go and win some more victories." But this same confidence never slacked during all the fatigues of the whole war. When upon the news of the movement of McMahon in our right flank, all the lines of march had to be changed and unheard of efforts were required of the men, so that thousands and thousands fell by the wayside from exhaustion, not only was there no complaint heard, but the soldier submitted to everything with good humor. In those days I heard one say: "Before the battle of the 18th we used to say 'Change front by army corps!' now the command is 'Change front by armies!' 'Forward!' Only let us get at them."

The spirit of our troops showed itself also by the fact that they never believed themselves beaten. Once I met an infantry regiment immediately after an unsuccessful attack. Do not ask me the name of the regiment and the engagement, for I would not like to hurt the feelings of brave men. The commander had led it for the first time under fire and was depressed as were his men, and all were afraid of the censure of their superiors. One of the latter said to me; "They are hanging their head, but I'll cheer them up." He galloped over to the regiment and called out with a loud voice: "Well done, Colonel, well done Grenadiers! That was a heroic charge! The regiment advanced farther to the front than any. That the charge was unsuccessful was not your fault. This is a glorious day in the history of the regiment!" At once they proudly raised their heads and the regiment was indeed no longer defeated. It had only lost so and so many officers and

men, but the rest fought with the old bravery and soon gave proofs of their invincibility. Troops which do not believe themselves defeated, cannot be defeated. They may lose men, may become smaller in numbers, may be annihilated, but never defeated. If our infantry had believed itself defeated at Vionville-Mars-la-Tour, on account of the immense losses, reducing their numbers by one-half or two-thirds, no one could have blamed them for it. But they could not believe themselves beaten, and therefore attacked again and again long after dark. That really made them victorious. It is the effect of the true soldierly spirit.

This spirit, the result of a discipline carefully exercised and based upon confidence, stood the test in former days, when the agitation of many minds and internal disturbances endangered everything that so far had been considered right and law so that the pillars of the social order seemed to totter. He who lived with us through the year 1848, will recollect that it was the spirit of the army that saved our social order from ruin. There discipline showed itself in the strongest light, that discipline which knows no fear, but considers orders inviolable. When in those days a grenadier of the King's regiment, enticed by revolutionists and made drunk with beer and liquor, was pressed, at the risk of his life, to swear, that he would not fire upon the revolutionists, he took the oath but with this proviso: "Unless it is ordered, for then I must fire." So thought the whole army.

Thus this spirit is the best bulwark against the destructive aims of socialism. So long as this spirit takes root in the minds of all men capable of bearing arms, by a careful education of every individual, so long as the people receive this education, which bears more lasting fruit than our present school education, so long will the pillars of our government institutions remain unshaken, however much attacked by those who advocate the employment of murder, incendiarism and dynamite for the purpose of furthering their ends.

But this condition requires the education of each individual, which is so capitally carried out in our infantry. The drilling of masses no longer suffices for this purposes. This drill, in which the man is simply a machine, has, it is true, accomplished great results in the past century. But since individual fire obtains, in which every man fights independently in a certain sense, the mechanical motion of masses no longer suffices. This could not be done in those days, because the men would desert one by one unless the camp was surrounded by guards and sentinels. Equally ineffective is the stick in case of revolutionary movements when the insurrectionsts tempt the individual soldier. Nothing short of a warlike and disciplinary education for the whole nation continued through years, can do any good. *The leaders of insurrection know this very well, and for this reason they urge, under all kinds of pretexts, that the term of service be reduced to two years and the army be converted into militia.*

Militia may be roused to great resolves by enthusiasm. But without the true military spirit, enthusiasm will remain a straw fire burning but a short time and dying out immediately under the reality of war with its fatigues and dangers. We saw that in the second part of the great war. The enthusiasm which Gambetta knew how to rouse in the French nation, made armies rise

out of the ground as it were, but they could not stand against the German troops, well disciplined as they were and imbued with the true military spirit, although they frequently had a threefold superiority of numbers.

It has been said, that the offensive is the mode of action of the stronger side, but that the defensive is the stronger mode of action. It seems apparent that he who, lying under cover, holds the assailant under fire, will gain the victory more easily than the one who is compelled to advance under well directed fire of the defenders. But the offensive enables the assailant to concentrate superior numbers at a point of his own choosing, and whoever takes the offensive is in a position to effect a surprise, while whoever remains on the defensive must be subject to surprise. Surprise in itself doubles the strength of the assailing force. Of greater effect than surprise is the moral impulse given by the offensive. He who resolves on the offensive, feels himself superior, he who remains on the defensive, confesses his weakness. The feeling of superiority on one side and that of weakness on the other communicates itself to the last man. If in addition, the defender must ask daily with apprehension and anxiety: "Does the enemy come from this or that direction?" he impairs the courage of his troops as well as their bodily strength. For he must keep them in constant readiness for battle, while the assailant is resting and taking care of himself, till the moment for the attack has arrived. Thus in 1864 the defenders of the Dannewerk kept their troops under arms within the fortifications day and night in snow and frost while we were quietly living in the villages close in front of the fortifications until fatigue and privations had so broken down the defenders that it was found advisable to surrender the works without battle. Thus the French troops designated for the sorties, camped between the forts of Paris and lost hundreds by frost, while our troops cooked, ate and slept in the villages at night and only formed for battle in daytime.

But where am I getting? I meant to write you only practical things on infantry and am now losing myself in an abstract comparison of the offensive and defensive. I see, it is time for me to close, and I ask your indulgence for this digression. The fact that the infantry drill regulations themselves, page 191, state the importance of preserving and fostering the offensive spirit of the infantry, may help to extenuate my digression.

Dresden, April, 1884.

NAPOLEON'S CAMPAIGN OF 1796.

A CONTRIBUTION TO THE QUESTION IN HOW FAR EDUCATION IS NECESSARY TO MILITARY GENIUS.

By CAPTAIN WALTER VON BREMEN, German General Staff,
Instructor in the War Academy.

Translated by Lieut. Alfred S. Frost, 25th U. S. Infantry.

(*By permission of the author.*)

"THE soldier who studies the campaign of 1796 without a knowledge of Napoleon's biography, is too apt to regard the twenty-seven year old general as a wonderful meteor, who improvised one of the most brilliant of campaigns by the exercise of his own natural gifts and, to a certain extent, unconsciously;" says a writer who was the first that sought to know this general and present him to our understanding in his entirety,* and then continues: "When, however, one probes deeper into historical events, he will find at last that the ordering of the world is not so arbitrary. In this memoir† we see that this success was preceded by a long and accurate study of the theatre of war and a due consideration of all the circumstances involved, and that, when Napoleon took command of the Army of Italy, he only found himself in a situation which had long been most familiar to him, and, we dare say, the great results were only born of greater labors."

We fully agree with Count York that the victories of Napoleon in 1796, as well as in his later campaigns, were the fruits of long-continued mental labor; but, when York says that the plan was founded on an accurate study and a due regard to the circumstances, this assertion needs a certain modification which is calculated to throw new light upon the whole elucidation of Napoleon. We are now able to maintain with certainty that the entire plan of the campaign of 1796 rested upon an older historical example, in fact, upon the campaign in upper Italy, conducted by Marshal Maillebois in 1745 and 1746. After reading York's account, the impression remains that, although it was the product of profound and long consideration, nevertheless, the leading idea of the campaign of 1796 was Napoleon's own.

Supported by later French researches, we will in the following pages seek to prove the above assertion. This paper shall therefore, be a contribution to the question in how far education is necessary to even the greatest military genius, and how far, in the beginning of its career, it seeks support from previous examples.

The French General Pierron, in a recently published work, "Les Méthodes de Guerre Actuelles et vers la fin du XIX Siecle," brings in sequence a number of events which we make use of in our argument.

* Count York von Wartenburg, "Napoleon als General." I., 18.

† The memoir to which Count York alludes is the "Mémoire Militaire sur l'Armée d'Italie," and the "Mémoire sur l'Armée d'Italie," both of the first days of the month Thermidor of the year III. (July, 1795), printed in Napoleon's Correspondence, I., 49 and 50.

The first question before us is whether Napoleon, before beginning the campaign of 1796, had an accurate knowledge of the wars of Maillebois in the same theatre. We are in a position to-day to answer yes without hesitation. Upon this subject there is an extraordinarily clear and penetrating work, "History of the Campaigns of M. C. M^{al} de Maillebois in Italy, dedicated to the King by M. C. Marquis de Pezay, Mestre-de-Camp, etc., Paris, 1775." This work is contained in three parts besides an excellent atlas of the country embraced in the various operations. This work accompanied Napoleon in the campaign of 1796. There is in an English work published in 1845, "The Napoleon Museum," page 236, a letter which the then Commander of the Army of the Interior, General Bonaparte, addressed, on the 11th Ventose of the year IV. (1st March, 1796), from Paris to General Calon, Director of the General War Depôt at the same place, in which Bonaparte asked him, among other works, to especially send the campaigns of Maillebois. He styled it briefly, "Mémoires de Maillebois."

But, there being no work with such a title, and as Calon, in a letter cited below, mentions an accompanying atlas, he undoubtedly meant Pezay's work above referred to. True, the original of this letter of Bonaparte's is not now to be found, but there is, however, a letter of Calon's, of the 12th Ventose of the year IV., addressed to the Minister of War, which refers to that letter. Calon mentioned therein that General Bonaparte desired a number of books and maps pertaining to the campaigns in Italy, and the work upon Maillebois and its accompanying atlas head the list.

As several of these works were not at hand, Calon, believing this information of importance to the recently nominated Commander-in-chief of the Army of Italy, requested authority to grant the means for their purchase. Beneath the letter is the endorsement of the Minister of War approving the supply of the required works.

It may also be looked upon as indisputable that Napoleon received the works in question before he started for the theatre of war. One may also go further and affirm with tolerable certainty that Bonaparte had previously known and studied this work and that he now only wished to have it with him. It is almost positively stated in Genette's "Mémoirs of the Chief Surgeon of the Army of Italy," that Bonaparte in 1793, when as an artillery captain he was stationed at Nice, knew and studied Pezay's book. Therefore it is no cause for surprise to find similar ideas in his memoranda pertaining to the campaign of 1796.

Before making a detailed inquiry into how far Napoleon's idea was called into being by the operations conducted by Maillebois, we will give a few words to this marshal. When this officer received command of the French troops in upper Italy, he passed for one of the ablest French generals. Already, in 1733, 1734 and 1735, he had commanded in Italy with success and distinction, and in 1741, he conquered the Island of Corsica for France. For this service he received the marshal's baton.

In the War of the Succession, he at first commanded a corps on the lower Rhine, and when the French under Broglie were shut up in Prague by the Austrians under the Archduke of Tuscany he received orders to relieve that fortress. The siege being raised by his advance, he was directed from

Paris to give up the undertaking as the issue was uncertain, and he accordingly led his army back into Bavaria where he effected a junction with the Bavarian army. Although he had won no important successes in this campaign, he was, April 1, 1745, placed in command of the French troops which in company with the Spaniards fought against the Piedmontese and Austrians in the attempt to conquer, for the Infant, Don Philip, the duchies of Parma and Piacenza, then in the possession of Austria.

At this time there were two Spanish armies in Italy * one in the Riviera under the Infant, the other under Count de Gages in the vicinity of Modena. The Republic of Genoa was allied with the French and Spanish and agreed to furnish a small contingent provided the French-Spanish army always maintained a force within its territory sufficient to protect it.

Opposed to Count Gages were the Austrian forces commanded at first by Prince Lobkowitz, afterwards by General Schulenburg. The Piedmontese army, then in Piedmont, was commanded by King Charles Emanuel in person.

As soon as the weather permitted, Maillebois caused the sous-chef of the General staff, Marquis de Monteynard, and two engineer officers to reconnoitre the passes leading into Piedmont from the Riviera. In a report of April 25, Monteynard pointed out the two most favorable passes, the one from Finale by Madonna della Neva into the valley of the Bormida, and that from Savona by Cadibona to Altare, likewise leading into the Bormida valley. The last route was taken by Bonaparte in 1796.

The army under Count Gages was ordered to unite with that under the Infant. Gages succeeded in deceiving the Austrians opposed to him in regard to his march and led his troops through the territory of Genoa to Campo-Morone at the foot of the Col de la Bocchetta (about 8 miles north of Genoa).

As soon as the Austrians (now commanded by Schulenburg) learned of Gages' march, they moved towards Oltaggio (Voltaggio) where they intrenched themselves about ten miles ftom Gages' camp. The junction of the French troops brought up by Maillebois and those under the Infant took place at Mentone on the first of June. Nominally the Infant exercised supreme command, yet Maillebois may be looked upon as the real commander. From Mentone the French-Spanish troops moved along the Riviera over Alberga to Finale, which they entered June 23. Here they entered the first of the passes mentioned above, reaching Madonna della Neva July 3 and Carcare July 14 without meeting with resistance. On the 16th they arrived at Acqui in the Bormida valley where they captured a weak garrison. At the same time Count Gages advanced from the Col de la Bochetta towards Oltaggio, turning the position of the Austrians, who retired on Portona.

The French-Spanish army under the Infant and Maillebois and that under Count Gages were thus enabled to effect a junction unopposed July 14 at San Giuliano, between the Bormida and the Scrivia, a few miles from Alessandria.

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*A large atlas is needed in order to follow the operations here described.

The combined Austrians and Sardinians, feeling too weak for the French-Spanish army, had meanwhile taken position behind the Tanaro, with the left wing at Bassigno on the Po, and the right at Montecastello. It may be remarked that this position played a rôle in military history in later times; in 1799 it was occupied by Moreau, and in 1859 by the Sardinian army. An advance against this naturally strong position gave little chance of success so long as the Austrians and Sardinians remained united; therefore Maillebois hit upon the plan of separating the first named from their ally by causing them to feel anxiety for, the at that time still Austrian, Milan. He threw a bridge over the Po near the mouth of the Ticino at Stradella, and sent a detachment to the left bank of the Po, which took Pavia by surprise September 21.

This diversion had the desired effect, for Schulenburg, anxious for the safety of Milan, separated from the Piedmontese and withdrew with his troops to cover that city. The Piedmontese, left to their own resources, were now obliged to so extend themselves behind the Tanaro that the French and Spanish succeeded in fully bridging and crossing that stream in the face of the enemy. The capture of Alessandria, the citadel excepted, and of Valenza, Asti and Casale were the immediate results.

Unfortunately for the success of this plan, the Infant was now ordered by his Court to take the Spanish troops and march on Parma and Piacenza, the possession of which they considered of the first importance to Spain. This was so much the worse, as at that time Frederick the Great had concluded his peace of Dresden, which enabled Maria Theresa to send considerable reinforcements to Italy. Consequently Charles Emanuel was again in position to take the offensive. With the loss of Asti, Maillebois was forced to retreat upon Novi. Casale and Valenza were retaken by the Piedmontese while the Austrians enclosed the Spaniards in Piacenza. Maillebois advanced to relieve the Spaniards and succeeded, although the battle of Piacenza, on the 16th of June, 1746. resulted unfavorably for the French and Spaniards. The latter now wholly evacuated Piedmont and fell back behind the Var.

These were the leading features of the campaigns of 1745 and 1746. The similarity of the situation at the opening of the campaign of 1796 and that at the time when Maillebois brought up the French troops, is apparent. The Piedmontese were allied with the Austrians in 1745, and so they were in 1796.

The position of the French troops on the Riviera in 1796 was similar to that of the Spaniards in 1745. In 1796 as in 1745 reinforcements were on the march from France, and in both cases they advanced along the Riviera. As in 1745 so also in 1796, the principal interest of the Austrians lay in covering Milan that of the Piedmontese in covering Piedmont and Turin.

In order to point out the similarity of the plans of Maillebois and those of Napoleon, it becomes necessary to take a closer view. From his own knowledge and the information obtained by the assistance of his son, who acted as his chief of staff, Maillebois prepared the plan followed by the Spaniards.

Concerning this Pezay tells us (II, 103): "More than one reason decided him to give preference to the plan to march along the Riviera: This route was better calculated to set free the troops which the allies intended for the protection of Genoa. Again, by marching into Piedmont he would at once avail himself of his superior strength, which would enable him to move with advantage against the King of Sardinia and force him if possible to retreat upon Turin. Accordingly, Maillebois' plan was, during his advance to send detachments agaidst the Camps of Ceva, Mondovi and all those strongholds lying along the Bormida and in the mountains, while he himself attacked Tortona and Alessandria, thus opening the gates of Montferrat, the eastern part of Piedmont about Alessandria. Finally, favorable circumstances coöperating, this plan promised to speedily force the King of Sardinia to abandon his alliance with the Queen of Hungary. It was at at least very probable that he would not be in a position to place auxiliary troops at the service of that Princess immediately and this was indispensable to her if she would maintain her position in Italy.

"The communications from the Var to the Tanaro were long; and even should the results aimed at be attained, this difficulty would be increased, especially if the army advanced and pressed still further into Piedmont. For this reason Marshal Maillebois decided to establish a shorter line of communications through the valley of the Oulx, (a tributary of the Dora Ripera).

"The French battalions remaining in the Dauphinate and the Spaniards in Savoy, both under Count Lantrec, were originally entrusted with this enterprise, of which the siege of Exilles (on the Oulx, northeast of Briançon) formed a necessary part. The success of these operations would secure the communications which at the same time would be shortened. It also made available for service with the main army, those troops previously left along the Riviera to cover its advance. Indeed, this route would no longer be necessary after the opening of the Valley of the Oulx.

"The taking of Ceva, Mondovi, Acqui and Serravalle, forts lying on the Scrivia, the Bormida, and the Tanaro, would suffice for the safety of Genoa; and the French general could then concentrate his forces and either annihilate the King of Sardinia or force him to a separate peace; and, in the one as in the other case, drive the Austrians out of Parma and Milan and throw them back upon the mountains of the Tyrol."

If one compares Bonaparte's memoranda of the year 1795 referred to above, (Napoleon's Correspondence, I. 49 and 50) with Pezay's version of Maillebois' plans, he will find the leading idea of Maillebois,—to move against the King of Sardinia with superiority, and force him to a separate peace and then to drive back the Austrians—recurring in manifold forms. "In the situation of Europe," says the first memorandum, "the King of Sardinia must desire peace. We must therefore by offensive operations: I. Carry the war into his states, let him see the probability that his capital will be endangered and then immediately demand peace. II. Force the Austrians to evacuate some of the positions from which they control the King of Sardinia and then place ourselves in such a position that we can protect Piedmont and carry on further operations. It is therefore essential to re-

take Vado* in order to invade Piedmont, to employ the good period of the year yet remaining in establishing a point of support for the concentration of our armies, to threaten Piedmont with a part and forthwith compel the King of Sardinia to make peace while offering him terms for its conclusion."

Bonaparte then lays down the advantages offered by a passage over the Apennines, especially at the bad period of the year, as compared with a similar passage over the Alps. "At the present time of year it would be unwise to undertake anything important over the Alps, but there is plenty of time to advance over the Apennines, that is, from the right wing of the Army of Italy." As we have seen, Bonaparte was acquainted with the passes used by Maillebois and it was owing to this that he too designated Vado as the point where the movement should begin. After the passage over the Apennines was accomplished and Ceva taken, and thus a point of support for further operations gained, the subsequent reinforcements were to be pushed over the Alps into the valley of the Stura in order to increase the anxiety of the King of Sardinia for the safety of Piedmont. Should he be not yet prepared to conclude peace, the operations against Turin will be proceeded with. "If, as appears probable," it continues, "peace is concluded we will, before it is known, have an understanding with Piedmont, fortify Alessandria, and push on into Lombardy so as to conquer the indemnity which we must give the King of Sardinia for Savoy and Nice."

Bonaparte speaks in a similar manner in the second part of the beforementioned memoranda (Corresp. I. 59): "The Army of Italy must be reinforced by the available divisions of the Army of the Pyrenees. It will then be necessary to take from the enemy the important place Vado.

"Once in possession of Vado, the roadstead must be prepared for defense in order to secure the rear against annoyance from the enemy's shipping.

"The Austrians will withdraw to the positions covering the issues into Lombardy."

Ceva is then designated as the next point to be reached where the troops approaching from Vado would unite with those from the upper Tanaro at Garessio.

"We will again move forward and seek maintenance in the plain of Piedmont showing the King of Sardinia an army ready to conquer his State. He will assuredly conclude peace.

"In this time of year [February is alluded to] when the snow closes the passes in the Alps, the troops guarding them will be reduced one-half, or the Army of Italy correspondingly increased, and it can then march upon Turin if the King of Sardinia has not concluded peace, or upon Milan if peace is concluded."

The instructions, founded on these memoranda, sent from Italy, July, 1795, to the commander of the Army of the Alps, and which enter into details, coincide fully with the plans mentioned. (Corresp. I. 83.)

"Assuming that the Army of Italy is put in motion as soon as possible,

*Vado lying between Finale and Sarona, was at that time still held by the Austrians and it had to be taken next as the point of egress for the movements from the Riviera over the Apennines nto Piedmont.

it can march on Ceva and take the intrenched camp there before the Austrians in Acqui have reached the Piedmontese. The subsequent operations are simple: If the Piedmontese are alone, move upon them by Garressio, Bagnasco, La Solta, Castelnuova, Montezemolo! Once they are overthrown and the intrenched camp taken, Ceva is to be invested.

"Should the Austrians attempt the reasonable project of uniting with the Piedmontese at Montezemolo, one must seek to separate them and to this end move upon Alessandria. These separated, it will take twenty-four hours for the capture of Ceva. If we have this, it will require a double strength to force us to raise the siege.

"Once in possession of Ceva not an instant must be lost in ordering forward the divisions covering Tenda, Briga, and the heights of the Countship of Nice. One must concentrate them at Mondovi, invest Coni by the division of the centre, and march at once upon Turin. The King of Sardinia will then make overtures for peace. With Turin in our hands, the investment of the Fortresses Alessandria and Tortona will be unnecessary. We will enter Milan with as little resistance as we would meet with in Champagne."

In all of these memoranda and instructions, there is a constant repetition of the thoughts,—separation of the Austrians from the Piedmontese so that each becomes anxious for his own territory; conclusion of peace with the King of Sardinia: an advance with superior strength against the Austrians as at first against the Piedmontese. Yes, even the further thought, of throwing the Austrians back upon the Tyrol which we find already proposed in the plan of Maillebois.

These coincidences become still more significant when one takes a nearer view of the course of both campaigns, especially that of 1745, following Pezay's account which we know accompanied Bonaparte in the campaign of 1796.

Pezay says, concerning these first operations (II. 122), that when Count Gages moved on Oltaggio (Voltaggio) from Campo Morone, north of Genoa, the combined French-Spanish army, which was encamped at Finale, put itself in motion in order to make a further advance. On the 30th of June the advanced guard of the right column appeared at Carcare on the headwaters of the Bormida, and that of the left column on the heights of Melagno and the San Giacomo.

By this movement Marshal Maillebois sought to draw the Piedmontese army toward himself and in this manner prevent the troops of the King of Sardinia from uniting with the Austrians to crush Count Gages, and thereby lead that prince to take the chances of giving battle on the frontiers of his kingdom under circumstances unfavorable to him.

On the same day, June 30, the Marquis of Mirepoix* received instructions to show himself with a considerable detachment on the upper Tanaro, and this correct combination caused the Piedmontese general, as Count Maillebois, the Marshal's son, had foretold, to order back to the Belbo those troops stationed at Triero on the Oiba; and thus upon Count Schulenburg, who was left to his own resources, rested the problem of holding Count Gages in check.

* This officer covered the left flank of the Spanish-French army on the upper Tanaro.

Upon the first dispositions of Marshal Maillebois for his advance, the army of the King of Sardinia, which was assembled in front of Alessandria, wholly withdrew to the left bank of the Tanaro. And, we will add, Count Schulenburg, after being driven out of Voltaggio, fell back behind the Tanaro by order of the King of Sardinia.

The resemblance these movements bore to the first operations of Bonaparte is at once apparent. By the advance of Cervoni on Voltri, Bonaparte proposed to draw the Austrians towards his right flank, then he advanced with all available strength by Montenotte on the enemy's centre, threw back the opposing troops and, after defeating a counter-attack of the Austrians, turned against Ceva, in which enterprise Serrurier's division, which had been left in the valley of the upper Tanaro, coöperated. The rôle which fell to the latter corresponds completely to the duty assigned to the Marquis de Mirepoix in 1745. Although the victory over the Austrians might have led Napoleon to follow them up, he did not permit himself to be deceived into losing sight of his primary object, namely, to force the Piedmontese to conclude peace. He firmly held to the leading idea which originated with Maillebois, and which he, too, regarded as the first object to be attained. So far Napoleon was in every respect more fortunate than his predecessor, Maillebois, for in 1796 the Piedmontese asked for an armistice fourteen days after the opening of the campaign, and it was granted on condition that they would surrender the fortresses of Cuneo and Tortona. The position in which Bonaparte now found himself bore a very great resemblance to that of 1745, and the measures he adopted correspond again to those of Maillebois. In 1745 the Piedmontese and Austrians fell back over the Tanaro and there took up a position with the left flank on the Po, the right resting on Pavone. We here give the course of these events after Pezay's narrative which was also known to Bonaparte.

Pezay states: (II. 127) "The French-Spanish army camped at San Giuliano, between Tortona and Alessandria. Schulenburg (who as we know commanded the Austrians) camped at Bassignano, with the Tanaro in his front. The Piedmontese posted themselves on his right along the same river from Montecastello to the confluence of the Bormida with the Tanaro (near Pavone). This position, naturally advantageous, has been greatly strengthened by art. The Sardinians and Austrians covered themselves on all sides by intrenchments. All the fords of the Tenaro were defended by a numerous artillery. In this position the Austro-Sardinian army seemed not only protected for the moment by its strength against every attack, but the river which it defended supplied them without interruption with the produce of the fruitful provinces lying in their rear, so that a want of provisions seemed never to limit the activity of the King of Sardinia so long as he made certain of holding it. Finally, the bridges thrown over the Tanaro always enabled this prince to send reinforcements to every point where the Infant Don Philip (nominal commander of the French-Spanish army) should throw his forces, to disturb every siege we undertook, to gain information of all our movements, to interrupt our convoys, to attack our communications and to make foraging difficult." After describing this position it continues (II. 137):

"On the 8th of September, Marshal Maillebois decided upon a plan which had long been considered in secret by him and his son.

"It is proof of a correct insight to feel that notwithstanding the unity of interests of these two nations the King of Sardinia always paid especial attention to the integrity of his own states; similarly Count Schulenburg was always more inclined to regulate his movements according to the personal interests of his sovereign, and according to that system which seemed most to favor the defense of her possessions in Italy.

"Out of this partiality, which was to be expected, out of this conduct of the opposing generals, naturally to be foreseen, sprang the hope of disturbing the harmony of their movements; and, from this prospective separation of their plans sprang the probability that out of some false move upon their part some advantage might be gained.

"Count Gages was ordered to throw bridges over the Po below the mouth of the Ticino, to push a detachment against Pavia, and at the same time move upon Piacenza, and it was reasonable to hope that Schulenburg on his side of the Po would cross the Ticino and hasten to defend the states of the Empress-Queen."

It is then observed that it would not do to make this diversion with too strong a force as that would so weaken the forces opposing the King of Sardinia that they would be unable to withstand an attack. Again it was essential that this entire plan should receive the approval of the allied powers.

"Finally," it continues, "he (Maillebois) was informed by Count Gages that the Duke of La Vieuville had entered Piacenza with a corps of from 4000 to 5000 men and twelve guns, and was taking advantage of the bountiful resources of that province. At the same the corps of the Marquis de Mirepoix on the upper Tanaro was reinforced; while Count Lantrec, reinforced by the six Spanish battalions remaining in Savoy, was ordered to make a diversion on Exilles. (This point closes the Valley of the Oulx.)

"These various movements embarrassed the enemy and made them very uncertain regarding their communications. Their common and their individual interests were simultaneously endangered. Even if the Austrians did not separate from the Piedmontese, the multiplication of these attacks would at least force them to weaken themselves very much, and at the point where our principal strength was concentrated, we were always in readiness to take advantage of their smallest error.

"After garrisoning Piacenza the Duke of La Vieuville was to march upon Parma. The capture of these two places would naturally result in the fall of Bobbio and therefore this enterprise was designated as the last to be executed by the detachment.

"With the remainder of his force Count Gages advanced to the Scrivia, and it must be pointed out as especially noteworthy, that in all the movements he had to make in order to make Schulenburg anxious for Milan, he must always be in a position to join the main body at the right moment so as to force a passage over the Tanaro the instant Count Schulenburg separated from the King of Sardinia.

"Count Gages was to send a detachment from the banks of the Scrivia towards the Po and throw a bridge opposite Stradella.

"Besides the expedition for the bridge at Stradella other detachments were assembled at various points. Great demonstrations were made and other bridges thrown at different points.

"At length all seemed to indicate that the assembled Spanish army was about to cross the Po and make a simultaneous attack upon all the Italian possessions of the House of Austria.

"These movements disquieted Count Schulenburg concerning the fate of Mantua and Milan, and soon decided him to send there eleven battalions of infantry, one hussar and one dragoon regiment. This was already a weakening of the Austro-Sardinian Army, but it was desired to effect an entire separation. His immediate interest served to enlighten the King of Sardinia concerning our true intentions, and even if he credited us with real designs against the left bank of the Po, he would nevertheless, seek to hold back the Austrian general so long as there remained the slightest possibility of an attack upon his own states.

"The threats against the points Exilles and Ceva left him no peace. A thousand grenadiers and a thousand Piedmontese horse were added to the six battalions already on the upper Tanaro and they attacked Acqui by his orders but were repulsed. The attempts against Marquis de Mirepoix were no more successful.

"Count Lantrec delayed in his march by the slowness of the six Spanish battalions approaching from Savoy, only received these troops when the season had so far advanced that the execution of his enterprise was impossible; but the movement assigned to him had for its object not so much the taking of Exilles as the weakening of the King of Sardinia by a new diversion, and this object was gained although the siege of Exilles was not undertaken.

"The Duke of La Vieuville surprised Piacenza and garrisoned it. The greater part of its garrison was captured; the rest retreated into the citadel and although for an instant it appeared as if they would defend themselves they capitulated at the first cannon shot. From Piacenza the Duke marched against Parma. Upon news of the fall of Piacenza the garrison of Parma had retired upon Mirandola, and Parma opened her gates to the Duke of La Vieuville. He mastered Bobbio by surprise; left sufficient garrisons everywhere, threw a new bridge below the mouth of the Trebbia, and rejoined Count Gages with his detachment.

"All these measures were still insufficient, Count Schulenburg seemed to rest satisfied that the detachment there under Count Pertusati would protect Milan, and Marshal Maillebois could look upon no result as complete so long as Count Schulenburg remained united with the King of Sardinia.

"It was necessary to resort to stronger demonstrations against the left bank of the Po. Therefore the Marshal advanced against Castelnuova di Scrivia, while Count Gages moved to his right towards Voghera. At the same time orders were given to Count Pallavicini, who was at the head of a strong infantry detachment supported by a few grenadier companies and a division of the artillery park, to fortify and defend the bridge of Stradella."

The foregoing is from Pezay's account. We may add that the Duke of La Vieuville passed the Po unmolested and garrisoned the city of Pavia, whereupon Count Schulenburg actually separated from the King of Sardinia and moved to the left bank of the Po.

Here again it is easy to distinguish the similarity of the operations by means of which Napoleon, after the conclusion of the armistice with the Piedmontese, deceived the opposing Austrians under Beaulieu. In granting the armistice Napolean had named as a condition that his army should cross the Po at Valenza without resistance. He thus caused his opponent, Beaulieu, to believe that he really intended to cross at that point, therefore Beaulieu, after crossing the Po at Valenza, fell far back behind the Ticino in order to cover Milan; in the safe assurance that the French army would follow by Valenza and make a frontal attack on the Ticino. But Napoleon had merely intended to deceive his enemy by this stipulation concerning Valenza. In fact, he imitated Maillebois when he sent a detachment by forced marches to secure the passage at Piacenza while his enemy still believed he would cross at Valenza. He deceived the enemy by demonstrations at that point and then effected his passage at Piacenza, and Beaulieu was turned and began his retreat behind the Adda.

Then followed the expulsion of the Austrians into the Tyrol and the investment of Mantua. To cover the same, the line of the Adige was occupied.

In his memoirs composed at St. Helena and, as is well known, to be accepted with caution, Napoleon speaks of the situation at this time and lays down that it was necessary to advance to this river. He animadverts upon the campaign in upper Italy in 1733 by Marshal Villars who neglected to advance to this river. Now it is very probable, as we will presently show, that Napoleon in 1796 had previously known and studied this campaign and the writings pertaining thereto, as well as the campaigns of 1745 and 1746.

In July 1795, he was assigned to the topographical bureau of the Committee of Public Safety for the Conduct of the Armies, and there he studied independently the complete collection of documents pertaining to this campaign which was only to be found in the War Department. Among these was a manuscript of General Bourcet Chief Engineer of Marshal Maillebois' Army in 1745, who had taken part in the campaign in upper Italy in 1733 and 1734 under Villars and Boigny. This manuscript was printed in March, 1888, and bears the title, "Principes de la Guerre de Montagnes, par M. de Bourcet, Lieutenant Général, Commandant en second de la Province de Dauphiné, Commissaire principal de la Limitation des Alpes, Directeur des Fortifications 1775."

In this writing the following is found:

"Marshal Villars, in the war in Italy, 1733, advised the King of Sardinia (at that time allied with France and Spain against Austria) to seize some such pivotal points as Pizzighettone, Milan, or Tortona, instead of the much more advantageous recommendation which Marshal Nehbinder (Commander-in-chief of the Piedmontese troops) vainly urged his sovereign to adopt. This proposal was, to advance the combined armies of France, Spain and Piedmont to the frontier of Trent in order to oppose the advance

of such troops as the Emperor might send into Italy. Now the frontier of Trent is the Adige River, and, as Napoleon in his memoirs discusses the campaign of Marshal Villars, it is very probable that he had studied the same before 1796, and had made use of the above-mentioned manuscript, which was safely accessible to him at the time we have referred to owing to his official position.

Maillebois had also seen the importance of shortening the communications, which until now led over the Apennines and along the Riviera, as is shown in the narrative of Pezay quoted above. The reduction of Exilles would make possible the opening of communications through the valley of the Oulx and by Briançon. Napoleon expresses himself quite similarly in his memoirs in discussing the situation after the conclusion of the armistice with Piedmont.

"The Austrians could now be pursued even into the interior of Lombardy; the troops of the Army of the Alps, which were now available, were descending into Italy; the line of communications with Paris (which now lay by Briançon instead of along the Riviera) was shortened by half."

We believe we have now proved that Napoleon derived the main features of the plan and the conduct of the first part of the campaign of 1796 from the study of the campaigns of 1733 and 1745, and that they arose not from an accurate study of the theatre of war, the political and kindred circumstances alone, but from an example which is distinctly recognizable.

But, it may be asked, how was it then in the second part of the campaign where he lacked such a pattern, did he not there too, show himself a master? We believe that the conception York gives of his hero in the critical situation during the first attempt of the Austrians to raise the siege of Mantua is not fully justified.

Let us briefly review the situation. Mantua was invested. To cover the siege strong detachments were pushed towards the Tyrol. At the end of July, Wurmser unexpectedly advanced in several columns and beat back the covering detachments with heavy losses. York now excuses the behavior of Napoleon as follows: "In this we recognize an appearance which we are not prepared for in Napoleon. In spite of the fact that he had long awaited this attack, when it really came he was at first utterly disconcerted and inclined to look upon his position as gloomy indeed. It may be true that in such situations the subordinate commander, who is not so heavily burdened with responsibility, remains calmer and sees more clearly but, nevertheless, one must avoid placing him upon a level with the general whose spirit, for the very reason that it is more active and comprehensive, pictures to the fullest extent the drawbacks of the situation and all of its possibilities."

York then, as an excuse for Napoleon's conduct at this juncture, pleads the nervous irritability to which all great men are subject: "Athough for an instant Napoleon looked upon the situation as unfavorable and hesitated in his decision, still the final result was that he judged clearly and acted vigorously; and it is this that makes the great general."

This assertion, as we will endeavor to show, requires a certain modification; for the manner and means by which Napoleon arrived at this decision

are conclusive upon the judgment and serve to show that Napoleon was not as yet the great general he afterwards became, for he never again acted in a similar manner. We believe that when one attempts to judge of a great general in the belief that he must have been such from his first appearance, a different result is arrived at than would have been the case without such preconceived notion. Therefore it will not be without interest to approach somewhat nearer to the conduct of Napoleon in question.

On July 29 (Corresp. I., 1805) Napoleon writes to Serrurier:

"Part of the division of General Massena is forced to fall back. I will repair to Castelnuova to-night with several demi-brigades. Perhaps we can again adjust matters; meanwhile I am forced to take earnest precautions for the retreat." And to Augereau, July 30 (Corresp. I., 806): "You must withdraw to Roverbella, General, abandon your line, break up the bridge of Porto Legnago, burn the carriages of position so that the enemy cannot use them to attack you during the retreat, and save what you can of the magazines. The moments are precious. I trust the execution to the judgment and wisdom you have always displayed. The unfortunate position of the army is as follows: The enemy has penetrated our line at three points, he is in possession of the important posts of Corona and Rivoli; Massena and Joubert are forced to retire upon Desenzano; the enemy has garrisoned Brescia and the bridge of San Marco. See to it that our communications with Milan and Verona are unbroken. Await new orders at Roverbella. I will repair there in person." On the same day he ordered Serrurier to raise the siege of Mantua and remove the siege material preparatory to its destruction.

This certainly indicates that Bonaparte scarcely thought any course open to him but a general retreat. This becomes still more significant when one reads for himself a hitherto unknown report of Augereau's as given by Pierron in the work we have mentioned. It reads as follows: "On the 30th of July I was ordered by General Bonaparte* to give up the line of the Adige, leave a garrison in Legnago, and march upon Verona where I would find 6000 men commanded by General Rampon, to add this force to my division, which would thus be swelled to 16,000 men, and put me in a condition to offer battle to the enemy advancing on Verona.

"The entire division, after receiving the most explicit orders, set itself in motion at daybreak on the 31st in order to attack the enemy. After an hour's march I received by courier an order from the Commander-in-chief in which I was advised of the general movements of our and of the enemy's army."

After referring to the order signed July 30, which we have given above, Augereau continues:

"After the receipt of the order I hastened to lead my division back to Legnago. I saved what I could of the magazines and gave orders to my troops to move upon Roverbella, retaining only nine grenadier companies, four hundred horse, and twelve light guns. I broke up the bridge, burned the carriages of position, and set out with this small detachment to cover the retreat of my division.

*Augereau received this order July 30; the one meant is that signed July 29, which is printed in Napoleon's Correspondence I., 796.

"Scarcely had I put a quarter of a mile behind me when I saw the enemy on the opposite bank of the Adige advancing towards Legnago; but, as they required much time to restore the bridges and cross the stream, the French retreat was unmolested. After marching three hours, knowing that I had nothing further to fear, I took the cavalry and repaired to the head of the division where I turned over the command to General Beyrand and went with a small detachment of cavalry and my staff to Roverbella. Great was my surprise and pain upon my arrival to find the troops of the garrison in the most frightful disorder! A sudden panic had overpowered them. The administrative officers increased the alarm by crying from all sides, 'The Uhlans are here, the enemy is here!'* The streets were so blocked by the wagons of the women who followed the army that it was impossible for the troops to make a passage for themselves.

"As soon as I saw the utter disorder and demoralization, I at once sent a staff officer to the approaching troops with orders to halt them wherever met and direct the commanding general to countermand every movement until further orders from me. My object was to preserve the troops from the dangerous spectacle presented by the garrison of the town, and not set before them the evil deeds of the criminal classes who abounded in the army in great numbers. Supported by my staff, without loss of a moment, I busied myself in restoring order. I appointed an able and determined officer commandant of the town, placed my cavalry detachment at his disposal, and in a short time the streets were clear and quiet restored.

"At about half-past three, the Commander-in-chief, Bonaparte, arrived with his staff. He dismounted near me and explained to me the position of each army. It was not an encouraging outlook but I answered him: There remain to us many remedies; remember that in this affair you will discover your true friends. The greater and more pressing the danger the harder must we strike the enemy regardless of his strength.'

"General Berthier, Chief of the General Staff, here took up the word and said, 'I believe that General Augereau is not yet sufficiently acquainted with the positions occupied by the enemy.' 'I know them better than you,' I replied, 'but here we need deeds and not words.' Bonaparte, who had been thinking a moment in silence, at length broke it and said, 'what would you do to save the army?' 'What must be done,' I replied, 'is this: Unite the troops, make an example of the wretches who spread dismay in the ranks of the army, and, above all, speak no more of retreat. I declare, for my part, that I will do so no more. The division I command has never yet been defeated. With such soldiers I will agree to defeat the whole Austrian army should it show itself before me. I would rather fall bravely at the head of my troops than dishonor myself by a cowardly retreat. This retreat once ordered it will no longer be in our power to check it. Order and discipline will govern no longer. During the flight every individual soldier will seek his own welfare and the peasantry will rise and slaughter the army by piecemeal.

"'I repeat it, I feel the danger of our situation, but let each general take

* It is here seen that the French fear of the Uhlans did not first date from 1870, but is a national characteristic.

an oath to defeat the enemy or die bravely, and we will all have done our duty, the enemy will again be routed, Italy freed and the Republic saved. You cannot be blind to the fact that the eyes of all Europe are upon us and that the instant we evacuate Italy, civil war will be enkindled in France. You say the enemy has garrisoned the bridges of San Marco and Brescia; my answer is, drive out the enemy and reëstablish our communications with Milan and Verona. A few hours rest will satisfy my troops. If I succeed in this plan, and of that I am assured, I will have reëstablished the communications of the army and that will be an important point.'"

Thus Augereau. We have no reason to mistrust this account, nor can we hold it as colored merely, for it fully agrees with the first orders issued by Napoleon and with other reports. Let us hear the words of another participant, Brigadier-General Lateille, in his "Considerations sur la Guerre" which appeared in 1803: "We had to retreat before the oncoming stream (the Austrians) and, unfortunately, raise the siege of Mantua which was nearing its end; but, in spite of the demoralization caused by the first moments of panic, the French army found itself united in an instant." From all these, especially from Augereau's report, it cannot be doubted that Napoleon lost his head in these critical moments. Also, on the 18th Brumaire, as we now know, he completely lost his self-control and only won the victory thanks to the energy of his brother Lucien. Later to be sure, as a general accustomed to battle and victory, this never occurred even in the most desperate situations. It is therefore all the more interesting to follow him in his first campaigns and observe that in all things he was not superior to his generals; that he even learned of them just as he made use of the ideas of the general who had previously found himself in a similar position.

Indeed, Napoleon followed Augereau's advice; he concentrated his troops and moved upon the points most threatened, Brescia and Montechiaro (south of the bridges of San Marco), *i. e.*, the very points where the Austrian right wing had penetrated; threw these back and marched against the main column under Wurmser, which in the meantime had pushed across the Mincio, defeating this too at Castiglione. And here for the first time, he resorted to THE OPERATION UPON INTERIOR LINES which in after years he employed so often and so masterly, and it is certainly not unimportant for the understanding of his genius that he owed its first application to the advice of a subordinate.

After achieving such great results with it himself, he never hesitated to recommend similar measures to others. Thus he writes on the 5th of March, 1800, to Massena who was similarly placed in Italy: "Do not be dismayed if the enemy attempts to place himself across your communications with your rear. Leave forthwith all positions which he will attack and throw yourself with all your strength upon one of his wings." This reminds us of Napoleon's position in 1796 and can be looked upon as the result of his experience at that time.

We are now at the close of our narrative. We have shown that the leading idea of the first half of the campaign of 1796 was entirely taken from plans previously followed by distinguished generals.

We now know that he had studied with the utmost thoroughness the

campaigns of these generals in the theatre within which he was called upon to operate, and that this is confirmed as well by the actual events as by his still preserved Plan of Operations. We have further seen that in the later course of the campaign there occurred an unforeseen and critical emergency and that even a Napoleon could be placed in a position where he lost his head and that he here learned, from a subordinate inured to war, a strategical operation which he afterwards employed with consummate skill.

But what lesson can we draw from this? First of all, that even the greatest military genius does not enter the world meteorlike, as a superficial view of the campaign of 1796 might lead one to believe, but, like all earthly things, is subject to the law of growth and development; that it not merely drops in the lap of mortal like a gift from the gods, but that it may also be attained by hard unremitting toil, for true to-day as of old is the saying: Labor is the price of immortality. Only by earnest and intelligent labor did Bonaparte prepare the soil from which sprouted his laurels of 1796.

In the second part he affords the double proof that from knowledge to practice there is always a long stride and that actions are essentially limited by the attributes of the character. Still we will hold to that other assertion that from ignorance to knowledge the stride is still greater; also that a strict and constant schooling of the mind united to these other factors is well calculated to build up character and thus prepare the way for action.

Military Notes.

THE QUESTION OF FIRING FROM HORSEBACK IN RUSSIA.

(From the *Revue du Cercle Militaire*. By Lieut. J. C. Bush, 5th Artillery.)

THE dragoons of the Russian Army, more than in any other have preserved the tactics and methods of instruction peculiar to this subdivision of the cavalry arm. As their men pass six years and even more with the colors it has been possible to unite a complete cavalry instruction with the practice of shooting and fighting on foot. The quickness and order with which they perform this exercise, the coolness and skill shown in the management of the led horses, the energy and purpose of the movements and manœuvres are most remarkable and surprising to foreign officers. On many occasions, in the Caucasus, in European wars and in the Balkan campaign of 1877, the Russian dragoons have rendered great service and have justified a reputation of which they are proud and with good right. These tactics, which are also those of the Cossacks, have been frequently employed in war, especially during the campaigns of the Caucasus in the contests which the Russian troops maintained against the warlike tribes of that vast and mountainous region.

This war introduced on both sides the employment of skirmish fire from horseback, especially practised by the Cossacks and dragoons during the period from 1820 to 1860. A similar circumstance occurred among the Hadjoutes and other Arab tribes at the beginning of the conquest of Algeria.

It was during this period, 1820–1860, that the military qualities of the frontier Cossacks reached their full development. During this same period also, the mountaineers, who obstinately defended their independence, ended by acquiring remarkable skill and a true military experience, thanks to the constant practice of daily fighting.

If the good order and organization of the Russian troops enabled them to overcome all obstacles, the mountaineers on their side astonished the Russians more than once by their dexterity and the bravery of their mad charges, which were always accompanied by a single musket volley carefully held in reserve for the moment of shock. The struggles were desperate between them and although at this time the musket was a muzzle loader, the shock was always preceded by a last shot, sometimes at point blank range, after which the carbine, thrown again over the shoulder was instantly replaced by the keen-edged chacka which did the rest.

In case of defense or pursuit a cartridge carefully reserved remained also in the flint-lock single-barrel pistol which could be used in the last ex-

tremity, either for personal defense or for stopping an adversary who endeavored to escape the blows of the chacka. Hence in these encounters a number of killed and wounded on both sides were caused by bullets and not by sabre cuts.

About this time these Cossacks of the Caucasian frontiers had occasion to measure their strength against European troops, notably in 1849 against the famous Hungarian cavalry, who could not withstand their tactics or shock action nor their volleys and sabre cuts alternating in this surprising way. To-day we occasionally meet old men who had taken part in this campaign who relate how bitterly the Hungarians complained of the barbarous fashion with which the sharp blade of the chacka cleaved a man from shoulder to waist.

The adoption of the repeating carbine, model 1891, in the Russian cavalry and the service expected of this perfected weapon have caused a renewal of the study of tactical problems and field service which admit of the employment of cavalry fire.

A distinguished officer, General Soukhotine, relying on the results formerly obtained with arms less perfect, but, wielded by men whose instruction and experience was complete, has gone so far as to propose to reëstablish in the regulations and instructions, the employment of fire from horseback, whether by single cavalrymen as videttes or in volleys by detachments more or less numerous, in a single rank formation like that of the Cossack "lava."

These propositions, which are at variance with the ideas which have prevailed for more than a century regarding the cavalry combat, have been the occasion of an interesting discussion in which a number of the most distinguished officers of the Russian army have taken part.

The partisans of this kind of fire say that the adoption of the new carbine ought to increase the independence of cavalry and its power of initiative, particularly so in regard to the Cossack regiments, although firing instructions have disappeared for some time from the cavalry regulations.

In support of this opinion they cite various facts from actual warfare, such as the fight of a cavalry platoon of General Skobeleff's escort during the Russo-Turkish war at Jeski-Zagra, in which the khorounjii or Cossack lieutenant Doukmassoff, who commanded the platoon, beat off a Tcherkesse detachment of three times his strength on very difficult cut-up ground, thanks to some volleys rapidly delivered before charging. This episode, which well merits a detailed description especially by the hero of it, is given in the "Souvenirs of General Skobeleff and the Russo-Turkish War" recently published.

The khorounjii Doukmassoff had received orders to take a platoon of the 26th Regiment of Don Cossacks to a point on the right flank of the Russian position and which threatened the Tcherkesses.

"I marched immediately to the appointed place," wrote Doukmassoff, "making a way with much difficulty through the vineyards and deeply sunken roads. On our route we met from time to time Bulgarian fugitives, men, women and children, crying with terror: 'The Turks! The Turks!' At a turn of a hollow road I saw all of a sudden at a short distance a thick cloud

of dust which came rapidly towards us. After examining it attentively for a moment I perceived a half sotnia of Tcherkesses advancing at a trot over the road towards Philippopolis.

"The ground did not permit us to act as cavalry, that is to charge, and we had no time to dismount, so I resolved to receive them with a volley from horseback. Having formed my platoon in fighting order and advanced to within 150 paces of the Tcherkesses, I had commanded Platoon!—when I heard a hasty exclamation from several of my men: 'Your honor! these are our Caucasian Cossacks!' And indeed the uniform of the cavalrymen who galloped in our front was so like that of the Cossacks in question that I myself hesitated for a moment. It was only by the absence of the shoulder bands that I knew we had to deal, not with the subjects of the Tsar, but of the Sultan. They were then quite near, and I could distinguish very clearly their swarthy complexions, piercing black eyes and savage expression of countenance.

"'Fire!' I cried, vigorously. 'It is the enemy. Platoon—Fire!'

"Immediately a volley rattled out and two Tcherkesses fell from their horses. The others surprised by these unexpected shots threw themselves to one side and rode past under the volleys of our sotnia.

"Having freed myself thus from an enemy three times our number, I continued the march toward the right flank and arrived promptly on the road to Philippopolis. Here in the near neighborhood of the city I chose a small spot in front of which, at a hundred paces, the vineyards commenced.

"I had not yet managed to orient myself and determine what I should do in case of attack, when suddenly a chain of Tcherkesse cavalrymen appeared among the vines and at the same time an entire squadron came up along the road its chief at the head, his superb uniform in bold relief against those of the men in rear.

"The moment was critical and if the enemy had been a little bolder and more energetic we should have been ridden over and done for.

"To charge with our handful of men would have been sheer folly, and I resolved to try once more the effect of a volley. 'Shoot your best, comrades!' I cried, turning towards the Cossacks. 'Platoon—Fire!' Some cavalrymen again fell from their saddles, the others hesitated, undecided.

"The Cossacks quickly reloaded their Berdans: 'Platoon—Fire!' cried I again, determined after the second volley to charge on the lances at a gallop, when at the same instant the Tcherkesses turned tail and fled. I gave them a parting volley and dashed forward in pursuit with the Cossacks in 'lava.' But the cut-up ground, the vineyards and the sunken roads prevented our urging the horses to their best speed and the Tcherkesses, used to these difficulties, soon distanced us.

"After reforming the men and returning to our first position I found, as the result of our first two volleys, six Tcherkesses killed and two wounded."

Here then are two critical situations in which a troop of cavalry came off with honor, thanks to the skill of its chief and to the manner in which he profited by the qualities of its armament and chose to extricate himself, not by the methods laid down in the regulations, but by those best suited to the circumstances of the moment.

The ground in one instance and numerical weakness in the other forbade an attempt to repulse the attack by charging, which however, was accomplished equally well by the volleys from horseback.

It is on such examples that General Soukhotine relies to sustain his argument that if the men and horses are sufficiently trained, time is gained and the best results more surely and quickly obtained by fire than by the charge, whether the men fire singly or by volleys without dismounting.

Nevertheless the final conclusion of this discussion appears to be that while against certain adversaries, such as warlike people without military organization, this mode of fighting may sometimes give good results, it cannot be taken into account on a European battle-field and among trained armies.

All great captains have given their opinion on this subject; Charles XII. and Frederick II. in particular prohibited fire from horseback for the reason that they desired to restore to their cavalry its distinctive tactics, based on timely and rapid attacks with the white weapon—lance or sabre.

Frederick II. at most only admitted the advantage of this kind of fire in pursuit of broken cavalry or by videttes or isolated flankers. He formally forbade it as a preparation for the charge by cavalry massed for attack.

General Dragomeroff, although a great partisan of fire-arms for cavalry, pronounced the same opinion, stating that "so long as the cavalryman is on horseback he can use only the white weapon to advantage." The Russian General Leer in his "Applied Tactics" gives the same opinion. To him fire from horseback does not seem reasonable and in support of his opinion he appeals to the authority of Turenne, Charles XII., Peter the Great and Frederick II. Finally M. Soukhomlikoff asserts that the Caucasians themselves, so often put forward in this connection, are far from partaking of the ideas attributed to them by the partisans of horseback fire: "Do not believe," said one of the most experienced among them, "do not believe that the dragoons of the Caucasus, if placed on a European theatre of war, would think of employing horseback fire in close order. It is an error which our regiments are too experienced to commit. All military men of the country are convinced of this."

However this may be, this interesting discussion has had the effect of placing in evidence that the Russian Army, far from considering the rôle of cavalry diminished by the adoption of the new appliances and the employment of smokeless powder, acknowledge on the contrary that this arm ought to find in these conditions a new motive of confidence in itself and in its independent action; regaining from them, in a modified form adapted to its present armament, traditions to which it has been indebted for numerous successes since the commencement of the century.

We remark also that the firing instructions of the German cavalry have been for some time the object of the most unremitting attention, perhaps with a view of permitting them to contend without disadvantage against another independent cavalry in which this form of instruction has been particularly well carried out and made an essential part of its field tactics.

EXPERIMENTS WITH SMOKELESS POWDER.

Major E. S. May, R. A., gives in a recent issue of the *Proceedings* of the Royal Artillery Institution a *précis* of the report of the experiments with smokeless powder made at Herr Krupp's factory.

Smokeless powders have hitherto been viewed with considerable suspicion from a service standpoint owing to their sensitiveness to the hygrometric condition of the atmosphere. If we are to trust Herr Krupp, chemical science has now mastered the difficulty, and he is possessed of powder whose stability leaves nothing to be desired.

In order to test what effect the state of the atmosphere was capable of producing, samples, weighing two kilogrammes, of four different natures of prism powder of various sized grains were exposed freely to the air for one year. These samples were carefully weighed every four weeks, and the quantity of moisture absorbed was judged by the alterations in weight. These variations were found at the end of the year to range from a loss of 1.6 grammes to an increase of 1.6 grammes, or, in other words, the powder lost or gained .08 per cent. of its weight in dampness during that time.

These results were considered very satisfactory when compared with the experience gained when black powder was similarly tested, when the variations are stated to have been five times as great. The treatment of the grains with graphite, which had been adopted to obviate the chance of their striking together, appears to have materially contributed towards security against damp.

The dangerous effect of a high temperature on smokeless powders is well known to every one who has used such an explosive for sporting purposes, and has been well exemplified in the accident on board the *Amiral Duperré* (noticed some time ago in these *Proceedings*), when a 34-cm. gun burst owing to the magazine in which the ammunition was stored having become unduly heated.

Herr Krupp contends that we need no longer fear such accidents with smokeless powder. He subjected his powder to a temperature of between 40 deg. and 60 deg. Centigrade for a continuous period, at first of four, and afterwards of fifteen days. The metal cases which held the cartridges are stated to have become so hot that they could not be handled with the hand unprotected.

Experiments showed that the muzzle velocity of the 8.7-cm. gun which with powder at a normal temperature (17 deg. Centigrade) was 624 metres, rose to 645 metres when powder was used which had been kept at 50 deg. Centigrade for fifteen days. The pressure of the gas similarly was only increased from 2320 to 2560 atmospheres, while the uniformity of the pressures developed throughout the bore were at the same time found to have been but little altered.—*United Service Gazette.*

THE PENETRATIVE POWERS OF THE GERMAN SMALL-BORE RIFLES.

The Military Intelligence Department at the War Office has published the following account of the experiments which took place at Spandau on

April 2 last, to illustrate the penetration of the 1871–84 11-mm. (0.433-in.) and 1888 pattern, 8-mm. (0.315-in.) German rifles. The course of experiments, which was conducted in presence of a large number of army surgeons, was undertaken at the instigation of the surgeon-general of the German army. The experiments were preceded by a lecture by Captain von Heyking, of the Imperial School of Musketry, in which he described certain trials with the 1888 pattern rifle, in so far as they had reference to those about to be undertaken.

The introduction of the smaller calibre, simultaneously with the employment of a new means of propulsion in place of the old black powder, had produced considerable increase in the velocity of the bullet, and consequently in its penetrating power. The increased penetration of the smaller calibre bullet, as well as its increased power of preserving its shape on penetration, had also been largely due to the steel coating (envelope). Captain von Heyking described how the introduction of this steel coating had been brought about, and how increased penetration had, at the same time, been somewhat accidentally obtained. Experiment had shown that lead was too soft to take the necessary rifling of the bore, while at the same time, the latter quickly became fouled. Trials were made with bullets of various metals which, though harder than lead, were somewhat lighter specifically, such, for instance, as steel, copper, and brass. At short ranges these gave good results as regards accuracy and penetration, but they quickly lost their velocity. Better results were obtained from wolfram, which is twice as heavy as lead. It was found, however, that this metal could not be obtained in sufficient quantity, and, moreover, it was too dear.

Major Bode now hit upon the idea of using a lead bullet with a coating of a somewhat harder metal. The lead gave the bullet the necessary specific gravity, whilst the coating was to furnish the rotation required for stabilitv. The coating was first made of nickel-plated copper, but this was not sufficiently durable, and a steel coating was tried. These last bullets were found to be very durable, and in addition to a low trajectory, had great accuracy and range, and lastly, what was quite unexpected, greatly increased penetration, due to the steel coating. Whilst the 11-mm. (0.433-in.) lead bullet on striking the target invariably sets up into a broad, generally mushroom-shaped, or hat-shaped, mass, the 7.9-mm. (0.311-in.) steel-coated bullet does not as a rule lose its shape, or, even if it does so, then very slightly, and, owing to its small diameter, loses relatively very little velocity and power in its passage through the object aimed at.

Captain von Heyking gave several curious instances of the penetrating powers, etc., of this last bullet. In the summer of 1891, whilst a company of Würtemberg troops were drilling in one of the barrack rooms, a rifle was accidentally discharged. The bullet passed through the body of one man, through the arm of a second, then through a cupboard, a bedstead, left its mark on the iron bedpost, and finally lodged in the wall. The man who had been shot in the arm called out: "I am hit"; the greater part of the men rushed to his assistance, a few searched for the bullet, while the remainder looked on, amongst the latter the man who had been shot through the body; he did not know that he had been wounded. It was not till after the

lapse of several minutes that he cried out: "My God! how weak I feel." It was only then noticed that he was bleeding freely from the wound, of which he died two days later. The incident was related by one of the officers of the regiment to which the man belonged.

With regard to the experiences of the recent Chilian war, Captain von Heyking maintains, in spite of the assertion of a high Chilian officer that the proportion of killed to wounded, as regards the small-bore Mannlicher rifle, was as four to one, that the reverse is the case. He referred to the testimony of an expert, whose report went the round of the papers, and, in which the author states: "The principal advantages of the Mannlicher were—great accuracy at short, medium, and long ranges, wonderful facility for acquiring its manipulation by the soldier, solidity and excellence in construction, its great influence on the morale of the troops, and, finally, the small proportion of mortally wounded." The wounds caused by the Mannlicher are of quite an exceptional nature; they either kill the man outright, or else insure recovery free from complications or excessive suffering. The bones were clean-pierced, even at the greatest distances, without leaving splinters of steel or lead, which usually cause aggravation of the original wound. The bullets, after extraction, had retained their original shape.

In an engagement at Bandeng, in Africa, where only small-bore rifles were used, it was noticed that several of the blacks, who had been rolled over at a distance of from 200 to 250 metres (220 to 270 yards), after a time rose, and, holding their hand to their sides or breast crept away into the undergrowth out of the line of fire. In the case of a soldier of the German colonial troops who was shot at musketry practice at a range of 250 metres (270 yards), the bullet passing through the upper part of the upper arm and grazing the bone, the wound healed in eight days, without the formation of matter, under a simple sublimate treatment, and without using more than two cotton-wool compresses, smeared with vaseline, placed on the points of ingress and egress (which latter could scarcely be distinguished from each other), and secured with a couple of turns of bandage; the compresses were at first changed twice a day, but, after four days, only once a day; the passage of the bullet closed already after four days. On May 1, 1891, in the suppression of the labor riots at Fourmies, and in 1890 at Biala, where the distances were very short, the wounds inflicted were very severe, and for the most part mortal.

The experiments of Professor Bruns, who fired from the Belgian 7.65-mm. (0.301-in.) Mauser rifle, are very interesting. He found that the bullet, even after perforating the strongest bones of the human body, would pass through from four to five men at a range of 100 metres (110 yards), three to four men at 400 metres (440 yards), and from two to three men at 800 metres (880 yards). He also showed that at ranges above 300 to 400 metres (330 to 440 yards) the small calibre bullet hardly sets up at all, while between 400 metres (440 yards) and 1500 metres (1640 yards) the bullet as a rule makes a wound with a very small passage, with very small apertures at the points of ingress and egress, and with very little shattering of the bones or tearing away of the softer substance. These wounds almost all bear a subcutaneous character, and since the bullet, or parts of it, seldom or never remain in the body,

may be readily healed without the formation of matter. As most infantry battles will be fought between the ranges mentioned above, Professor Bruns has some justification in calling the small calibre rifle a most humane weapon.

The Austrian Army Surgeon, Dr. Habart, arrives at similar conclusions as to the humane character of the small bore bullet, but is of opinion that infantry fights will often take place at ranges of from 1200 to 1800 metres (1300 to 2000 yards). He divides his distances into zones, as follows: Up to 500 metres (550 yards) the zone of "setting up" (explosive action); 500 to 1200 metres (550 to 1300 yards) the zone of the "clean hole through;" 1200 to 1800 metres (1300 to 2000 yards) the zone of "splitting up and tearing;" 1800 to 2600 metres (2000 to 2850 yards) the spent-bullet zone of "splitting up and tearing."

Somewhat analogous results were obtained by Delorme and Chavasse, Professors at the Veterinary School at Paris, with the Lebel rifle. The above results are, however, not altogether free from objection, since the results for the longer ranges were not obtained with service charges at these distances, but by so diminishing the powder charge as to get the remaining velocity that the bullet would have at the various ranges with the ordinary service charge. These diminished charges would obviously produce different effects, as regards rotation and rise of temperature, from those which would be produced by ordinary service charges. The effect on dead bodies would also not be precisely the same as on living men. It is worthy of note that Dr. Habart also collected statistics with regart to suicides and accidents. He describes how a shot which had come from a firing point 2300 metres (2500 yards) distant, struck a soldier of the 23d Rifles, passing through his skull and stony-bone (Felsenbein), that is to say, through the strongest bone of the human frame.

The result of the experiments, carried out partly with the 1871–84 and the 1888 rifles firing at two precisely similar targets, were as in table below.

The far less explosive action of the new small-bore toughened lead bullet with an envelope was most apparent. A wish was expressed that these highly instructive experiments might be the first of a series, which would tend to bring the combatant and medical officers together in a mutual desire to arrive at the real effect of newly discovered missiles upon the human frame.

RANGE 50 METRES (55 YARDS.)

	1871–84 Rifle—Bullet of toughened lead (70 per cent. lead, 15 per cent. antimony, 15 per cent tin).	1888 Rifle — Bullet of toughened lead with nickel-plated steel-coating (head 0.0354 in. thick, sides 0.0158 in thick).	Lebel Rifle—Bullet of toughened lead with nickel coating.
Calibre	11 mm. (0.433 in)	7.9 mm. (0.311 in)	8. mm. (0.314 in.)
Weight of bullet	25 gr. (385.8 grains)	14.7 gr. (226.9 grains)	15 gr. 231.5 grains)
Powder charge	5 gr. (77.16 grains)	2.75 gr. (42.44 grains)	2.8 gr. (43.21 grains)
Velocity of bullet 27 yards (25 metres) from muzzle	435 metres (1,427 feet)	620 metres (2,034 feet)	630 metres (2,067 feet)

THE BRUCE ELECTRIC WAR BALLOON.

The Bruce Electric War Balloon is made of a translucent material and carries within it incandescent electric lamps connected with a signaller on the ground or the deck of a ship. With these lamps it is possible to signal by the Morse or any other code, and from a great height. Experiments were made on Thursday and Friday evenings July 7th and 8th, with the Bruce Balloon, at the Stamford Bridge Grounds, Fulham Road, before Prince Edward of Saxe-Weimar and a distinguished company, the object being to exhibit the improvements made in the apparatus since the invention was first taken up by the British Government in 1885. The strong wind blowing interfered somewhat with the proceedings, but sufficient was accomplished to show the great utility of the system. Six incandescent lamps worked to 16 or 20 candle power produce the flashes of light inside the balloon. The six lamps take about 9 amperes. The electro-motive force required for the lamps is 24 volts. The battery used is 26 cells of the Electrical Power Storage Company, E. 7 type. The improvements mainly consist in the reduction of weight in almost every portion of the apparatus, so as to increase its portability and efficiency. The balloon is made of a much lighter material than those first exhibited. The weight of the ladder-shaped holder inside the balloon is reduced to a minimum. The flexible conducting cable is also much lighter than hitherto. Each of the electric storage cells now only weigh 24 lbs. A very considerably improved signalling key was also exhibited, in which carbon contacts are used; these can easily be renewed at trifling cost when worn away by the sparking. The system of signalling by the translucent balloon can be supplemented by an arrangement for flashing lamps outside the balloon. This plan is thought to be better adapted for certain conditions of atmosphere, when penetration is desirable. A new arrangement for thus flashing lamps suspended from the balloon was also exhibited. It has, however, been found in practice that the system of flashing lights inside the balloon has, in clear weather, great advantage over outside naked lights, producing flashes that are sharp and distinct, whereas signalling with naked incandescent lamps is apt to produce indistinctness, owing to the fact that incandescent lamps do not cease to glow instantaneously when the current is interrupted.

It has been suggested by the Royal Engineers that the Bruce balloon would be invaluable not only for signalling purposes but also (1st) as a preconcerted signal, (2dly) as a point to march on, or guide an advance or retreat at night. In some cases also it would be most useful as a light for working parties, owing to the diffusion of light from the large illuminated surface. The balloon is also invaluable for Navy signalling, as by its means signalling from below the horizon is possible. It is also adapted for coast signalling, for lightships, etc.—*United Service Gazette.*

THE FRENCH MANŒUVRES OF 1891.

At the Royal United Service Institution Major George F. R. Henderson, York and Lancaster Regiment, Instructor in Military Tactics, Administration, and Law, read an interesting and critical paper on the French Autumn Manœuvres of 1891.

Major Henderson commenced by observing that very few have paid attention to the great changes in organization and in training which have been made in the military system of France, and then proceeded to describe the country handed over to the French troops from September 3 to 18 last, the composition of the forces, and the course the manœuvres took. The sum voted for the operations amounted to more than 1,300,000 francs, that is over £50,000 sterling. The existence of a programme, worked out long beforehand down to the minutest detail, and known to all engaged, not only prevented any opportunity of determining the strategical skill of the generals, but of judging the real efficiency of the staff. The main features of the grand tactics were: First, the concentration of the cavalry divisions forming the screen; secondly, the employment of the artillery in masses; thirdly, the energetic attack of a large mass, moving in a body against the tactical objective; and fourthly, the constant tendency to assume the offensive.

How bad the French artillery of 1870 was very many people have not yet realized; how good are the batteries of 1892 only the test of war will reveal, but we may be sure that the balance will be far more even. Smokeless powder, as used by masses of artillery, does not do much to render the guns less visible. There are always bright white flakes of flame which immediately attract attention, and on dry soil the cloud of dust driven up by the explosion is always seen from a long distance. Two batteries of howitzers, 12-cm., were employed at the manœuvres. These guns fire melinite or melinite and cresylite shells, heavy as they are, with huge glycerine brakes; they move across country, and are likely to be far more efficient than the mitrailleuses, now discarded, on which so much dependence was placed by the last Napoleon and his military advisers.

In France, as elsewhere, a great deal of adverse criticism has been showered, not so much on the French cavalry as on the cavalry generals and it is said their action or inaction by no means received the approval of the supreme authorities. It has been said that the cavalry missed many opportunities. But the cavalry cannot be everywhere, and when the front of battle extends to seven or eight miles it is manifestly impossible that it should be able to seize every opportunity that offers. As to the general appearance of the arm, it compares well with other European cavalry. It is well horsed, on the whole, though somewhat uneven in this respect, and the Cuirassiers are under-mounted. The improvement in riding is very marked, and the divisions manœuvred easily and rapidly when *en masse*. The dragoons are armed with lances, but their brass helmets and the bright cuirasses of the heavies are exceedingly conspicuous, catching the sun at a long distance. The light cavalry, the chasseurs, look more workmanlike, both horse and man, than either, and their plain sky-blue uniforms are well adapted to field service. No horses under six years old are allowed in the ranks, but as the peace strength of the regiments, as in Germany, is greater than that for war, the ranks are not thereby attenuated. There were a good many sore backs, principally amongst the corps cavalry, and in all probability due to the unsparing use of the men as orderlies by the infantry commanders.

France has no mounted infantry, but she evidently intends to supplement the fire capacity of her horsemen. There were ten chasseur or rifle battalions engaged in the manœuvres, and the majority of these at one time or another, were employed in support of the cavalry. These troops, perhaps the most highly trained in the army, are magnificent marchers, equalling the Bersaglieri in rapidity of pace and also in endurance. The 5th division, at Colombey, was supported by a battalion which marched six miles (the packs being carried in carts) under the hour, and in all the cavalry operations these auxiliaries were used to hold important tactical points, and to set free the horsemen for the shock. At the same time the cavalry is considered capable of fighting on foot, and of attacking on foot too.

Turning next to the infantry, Major Henderson said that he did not think any infantry officer present at the manœuvres could speak of the French infantry soldier otherwise than in terms of the highest praise. The weather during the manœuvres was very hot, the thermometer sometimes reaching 95 deg., and even more; the marches were long, varying from fifteen to thirty miles, the engagements were numerous, and the work, with the exception of the outpost duty, heavier than would generally be the case on actual service. And yet few men fell out, and the sections of fours kept closed up even at the end of a long march. The Marine Brigade had a large number of casualties, but the ambulances attached to the infantry battalions seemed never to be overcrowded, and were very often empty. Discipline on the march was strictly maintained, and as regards mobility, the French infantry of to-day is in advance of that of 1870.

The attack formation of the French infantry merits attention, as it has certain marked peculiarities. The advanced guards, under cover of which the marching columns approach the enemy's position, are strong, especially in artillery, three batteries being detailed to the normal advance guard of a division; and under cover of this screen the army corps deploy for attack as single units—that is, the whole twenty-four battalions moved forward simultaneously, formed in three lines. The deployment in three lines preliminary to the advance is made with much attention to distances and intervals, and hurry is carefully avoided. The Staff of the *corps d'armée* seemed perfectly familiar with the art of handling large masses as single units. The deployment being completed, generally outside the extreme range of the enemy's artillery, the several lines moved forward together, the first line gradually breaking up into smaller and smaller fractions; these fractions gradually extend, and the firing line gradually thickens, until at about 1200 yards from the position, the whole front is covered by a screen of men in single rank, each squad of twelve or fifteen rifles separated by an interval from those right and left, and the men moving with plenty of elbow-room. Behind come the supports, generally in single rank, then the battalion reserves, and in rear again the second and third lines, and in some instances, a fourth line, or general reserve. Firing when on the offensive, began, as a rule, between 1200 and 800 yards, and Major Henderson never observed much delay in the advance until the decisive range—within 500 yards—was reached. By the time the firing line had reached this distance, the supports and reserves had closed up, the second line was near at hand,

and the advance was continued by rushes of 60 or 70 yards. Supports and reserves were brought up, and magazine firing commenced. The second line now came forward, and after a very rapid fire bayonets were fixed, and with drums beating, and the men shouting "A la baïonnette!" the whole line charged the position.

The English officers present were specially struck with the good order and regularity of the whole movement. Until the movement just preceding the assault, the successive lines advance at a steady pace, every portion of the force preserving its proper interval, and the men keeping their dressing, not absolutely accurately, of course, but sufficiently to give the movement an appearance of strength and cohesion which was most effective. Little less remarkable was the absence of noise. Whistles and signals are used by the officers, and shouting is strictly prohibited. Thirdly, the company officers in the firing line were left entirely to themselves. All officers dismounted when within long rifle range, and every one, from the commanding general downward, retained the same position during the whole of the manœuvre. So far, the mechanism of the French attack seems well adapted to modern battle-fields; but in several respects, very noticeable at the manœuvres, the requirements of active service seem to be sacrificed to an over-scrupulous regard for the niceties of the parade-ground.

In the endeavor to maintain order, intervals, and distances, not only was cover disregarded, but there was a deliberate avoidance of all intermingling of sections, companies, or battalions. In fire-discipline, since 1870, the French military authorities have introduced a remarkable reform.

It appears to be considered in France that inattention to details on the parade-ground is not incompatible with the strictest discipline in the field. Nor is precision in close-order drill and in the manual of arms understood as the necessary foundation for precision of movement, good order, and subordination in battle formations. The French regimental officers look well after their men, especially in cantonments; they treat them in a very fatherly manner, and much good feeling appears to exist between all ranks. One thing may certainly be said of the French Staff, and this is that they have proved themselves fully equal to the task of concentrating, feeding, and moving 100,000 men in a confined space, and also in dispersing them without delay to their respective garrisons. It must be put down to their credit that the manœuvres, extensive as they were passed off without a single hitch.—*United Service Gazette.*

Reviews and Exchanges.

Whistler's Graphic Tables of Fire. *Artillery Circular C.**

THAT Ballistic science should have attained the prominent position it now holds in the mental equipment of a modern artilleryman is not to be wondered at. Progress demanded it. The precision and power of modern guns make it possible for a gunner to operate upon an enemy at distances beyond the limits of distinct vision, but to do so effectively and with due regard to economy, the gunner must have scientific assistance. "Finding the range" is an art which never can be thoroughly acquired without some knowledge of the science of ballistics. No doubt "The Bracket System" can be used with sea-coast as well as with field guns, but the advantage of a short bracket to begin with is immensely more important with the heavier gun. Some knowledge of ballistics then is essential to the efficiency of the sea-coast gunner.

There has been a good deal done of late intended to bring the solution of practical problems in ballistics within the capacity of the average gunner. Captain Ingalls has done good work in this important field. His Ballistic Tables were a long step towards the successful solution of the problem, and probably stimulated the ingenuity of others to operate on similar lines. At any rate, "Whistler's Graphic Tables of Fire," published in Artillery Circular C. of June 23, 1892, from the Adjutant-General's office exhibit a simple, graphic, accurate and practical method of reaching the same results by inspection.

Lieut. Whistler's Graphic Tables of Fire for the 8" M. L. R. cannot help but be a success. Assuming their accuracy as sufficiently vouched by the name of their author, we directed our attention first to their usefulness. Would they be intelligible to the average gunner? As a test we handed the chart to a non-commissioned officer, with the request that he examine it, and see if he could make anything out of it. It is fair to state that the sergeant had been instructed in the use of Ingalls' Tables. Next morning he reported that Lieut. Whistler's Chart was exceedingly simple, and that he could use the tables with facility. Similar statements were made by another sergeant who had obtained a copy of the chart at Fort Monroe. The simplicity, and therefore the usefulness, of the Tables are undeniable.

There are nine tables on the chart. No. 1 is a table of three elements, viz.: Initial Velocity, Angle of Departure, and Range of Shot; any two of which being known, the third can be read from the table. The amount of ballistic computation, which a gunner altogether innocent of mathematics, can deduce from this table, is simply enormous. And it is as easy to read as the old-fashioned tables. But it has a great advantage over the old tables. They were calculated for a theoretical initial velocity very rarely attained. With table No. 1 the gunner can determine the practical initial velocity for himself, and then read the table, with that initial velocity, as part of the argument, with as much ease as he could read the old tables. Lieut. Whistler calls

**Whistler's Graphic Tables of Fire with Chart.* By 1st Lieutenant G. N. Whistler, 5th Artillery, Adjutant-General's office, Washington, D. C., 1892.

the initial velocity thus found "The Reduced Initial Velocity," and says that it may be used without sensible error during the day, or while atmospheric and other conditions remain unchanged. We should like to call it the gunner's initial velocity, which is the true one.

With the Reduced Initial Velocity and the Angle of Departure as arguments, Table No. 1 becomes a table of ranges for the day which any gunner can understand.

While the gunners of the past, especially in active service, have been content with close approximations in ballistic calculations, and have drawn largely upon their experience and judgment for the slight corrections demanded by insignificant variations in ballistic data, modern gunners must be more exact. Rule of thumb corrections are inadmissable. Corrections must be correct, and Tables Nos. 2, 3, 4, 5 and 6 enable the gunner to make them so.

In Table No. 2 he can read the variations in range due to variations in weight of projectile with sufficient accuracy for practical purposes. This may be called the first correction. Having found the range from Table No. 1 he corrects it for the variation of weight of shot and then proceeds to determine the second correction.

The second correction is that due to direction and velocity of the wind. The wind-vane and anemometer give him the needful data, which he resolves into components, and entering No. 3 with the range reads the increase or decrease due to a wind of one mile velocity. This increase or decrease is multiplied by the number of miles in the accelerating or retarding component, and the result is applied as the second range correction.

No. 4 is a double table intended to supply the correction for variation in atmospheric condition. The elements of the right-hand table are Barometric reading, Thermometric reading, and $\frac{\delta_1}{\delta}$ (the ballistic value of the density of the air). As the barometric or thermometric readings change, the corresponding value of $\frac{\delta_1}{\delta}$ changes, and this change can be read from the table, and the *percentage* of change can be noted without difficulty. The variation in range due to one per cent. of change in the value of $\frac{\delta_1}{\delta}$ can be read from the left-hand table, and when multiplied by the actual percentage of change is applied to the range as the third correction.

Table No. 5 deals with what has always been a very troublesome element in determining ranges, namely, "Difference of Level." The elements of the table are the initial velocity, and the variation due to a difference in level of one foot. With the two first as argument the gunner reads the variation for one foot, and multiplying by the number of feet of difference in level, applies the result to the range as the fourth correction.

Table No. 6 is a startler. It gives the jump of the 8″ M. L. R. at elevations ranging from 0° to 11°. The table exhibits two curves, one deduced from Ingalls' experiments and the other from Whistler's. There will be no difficulty in using the table. The jump according to Ingalls or Whistler can be read directly from it. The startling feature is the sudden change in Whistler's curve a little short of 7°. Will any philosophical artillerist explain why the jump should take such a turn at that particular point? Such an explanation is absolutely essential to perfect confidence in the descending branch of the curve.

Table No. 7 (Time of Flight) needs no explanation. Like No. 1, its great advantage over old-style tables is its recognition of different velocities. The gunner by means of No. 7 can determine the time corresponding to any range and initial velocity to a tenth of a second.

No. 8 is the table for angle of fall. The elements are range, initial velocity and

angle of fall, and knowing any two of which the third can be read from the table. This table will be of great use to the gunner.

No. 9 is the table of remaining velocities. The elements are initial velocity, range and remaining velocity. It needs no explanation.

We have traversed the tables with the view of determining their usefulness to the average gunner, and feel perfectly satisfied that they are a success. Lieutenant Whistler has so exhibited the science of ballistics, that the solution of its most abstruse problems are brought within the capacity of the average gunner. He deserves the thanks of the Artillery, and his tables ought to be in the hands of every gunner.

We have only one suggestion to make. The original blue print is inconveniently large. The chart in Artillery Circular C is too small. It should be printed twice the size of the latter, on strong card-board, and at least a dozen copies should be furnished every battery of artillery. It contains more useful ballistic information in a practically available form than anything we have yet seen on the subject.

Of course tables should be constructed for our new guns.

JAMES CHESTER,
Captain 3d Artillery.

The Engineer Arm in the Italian Army.*

Within the narrow limits of this small pamphlet the writer, a captain of engineers, gives a very clear and interesting account of the past and present work of his "arm." The work is designed by the author primarily for the students at the school at Turin, and, incidentally, to furnish his fellow officers of other branches of the Italian service with some idea of the duties of the engineers in peace and war. We may say that its usefulness will also be appreciated outside of Italy, for it affords exactly the kind of information that the officers of other countries would be likely to desire. We find first a historical sketch of the origin and progress of the engineers in Italy, next an account of their org ation, training and duties in time of peace and of war, and finally a very definite statement of the relation of the engineers to the general command.

The writer points out with pardonable pride the pioneer work of Italy in the organization of this important branch of the service in modern armies. Under Charles Emmanuel I. of Piedmont (1580-1630) they became a distinct organization having charge not only of fortifications but also of many other important duties now discharged by the general staff. Their connection with the artillery service seems to have been more or less intimate, and at one time (1726) they formed a part of the artillery staff, but were permanently separated in 1733. Although the corps (now, by the way, called an "arm") began on a very limited basis, its history has been one of almost uninterrupted increase and growing importance. It experienced total extinction in 1799, many of its skilled officers finding employment in foreign armies, but it was revived in 1814 on the restoration of the kingdom of Savoy. At that period civil as well as military duties were assigned it, but this arrangement appears to have proved no more satisfactory here than elsewhere on the continent of Europe, for it seems to have been but short lived, and from 1818 the civil and military duties have been carried on by separate corps. From that period to the present day the gradual increase has brought this arm up to the very respectable total of 569 officers (not including a considerable number of officers—about 90—of the engineer staff, who are *fuori quadro*) and four regiments, with a total of 74 companies. When we consider that this large

*_The Engineer Arm in the Italian Army_. By B. Lanotti, Professor in the School of Application for Artillery and Engineers, Turin.

force is occupied with duties entirely military, we look with no little interest at the account of the character of their work, especially in times of peace. Specialization seems here to be carried almost to an extreme. For example we find that the sappers and miners are separate and distinct, although their training differs only slightly. A special body of men (*lagunari*) is set aside for service on the Italian lakes and the Venetian lagoon, and is composed of men skilled in the boatman's craft in all its various branches. We note further the companies of telegraphers, balloonists, or "specialists" and "railroad men" (*ferrovieri*), these last named being specially trained in the construction and demolition of railways. It is curious to learn that the pontoniers, with us considered especially an engineer branch, were until as late as 1874 a part of the artillery and constituted the 1st Regiment.

Although the Italian engineer has no duties in connection with civil engineering works he has charge of much that in our service belongs to other branches, such, for example, as the building of barracks and quarters.

The men of the corps seem to be selected from the annual contingent in such a way as to form a veritable *corps d'élite*. Tradesmen especially seem to be taken for this service and perhaps the fact that neither the mobilizable militia nor the territorial militia (first and second reserves) are ordinarily called upon for service in time of peace, may tend to make the corps a desirable one.

In the matter of the supply and promotion of officers it is curious to note the many radical differences from our own system. The majority of the officers come from the school at Turin, although promotions of non-commissioned officers are provided for. These are usually, but not necessarily, graduates of the non-commissioned officers' school at Caserta. Promotion for the first-named class of officers is lineal and without examination but for the second class an examination is required on arriving at the promotion to a captaincy. Ordinarily these latter officers go into the train, but may, by undergoing a special examination qualify for the more scientific branches. In the higher grades promotion by selection is recognized, though rarely made.

The elaborate provisions as to the relations of the engineer to the general command, his powers and limitations, might well be studied on this side of the water, where the functions of the "specialist" seem so often to have given rise to discussion and disagreement.

This little book is so admirably condensed and well expressed that an attempt to summarize it further seems almost like mutilation. To be properly appreciated it should be taken as a whole.

T. C. P.

24 Stunden Moltke'scher Strategie.*

A timely work has recently appeared from the pen of Captain Fritz Hoenig, which is of absorbing interest to the military student. Captain Hoenig is a graceful writer and a profound thinker and has already acquired an international reputation which is by no means jeopardized by his latest work. In a word he has described the battle of Gravelotte as it has never been described before, throwing new light upon features of that battle which were always difficult to understand, and showing that even the work of the General Staff was too careful of certain reputations to give a plain unvarnished tale.

The Captain's motto may well be quoted as it is an earnest of what follows:

"It is impossible to carry the torch of Truth through the crowd without singeing somebody's beard."

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* *24 Stunden Moltke'scher Strategie, entwickelt und erläutert in den Schlachten von Gravelotte und St. Privat, am 18. August*, 1870. Berlin. Friedrich Luckhardt, 1891.

At the outset the Captain tells us that this book represents labor covering a considerable period of time, that it was ready for publication when Moltke's History of the Franco-Prussian War was first announced and that he then laid his manuscript aside in the expectation that Moltke would clear this question up and make his labor unnecessary. As, however, Moltke said little or nothing upon this subject, our author prepared his MSS. for the press.

The strategy preceding Gravelotte and St. Privât is compared to that of Napoleon I. at Jena, for Moltke, like Napoleon, considered that the enemy would adopt the most judicious measure and he accordingly directed his armies to the left of Gravelotte as Napoleon had directed his to the right of Jena on Gera. Accordingly, when each found that the improbable had happened there was a change of front to close with the enemy.

So far there is a likeness between the Metz and Jena campaigns but here the likeness ceases.

Napoleon, as his army came closer and closer to the enemy, pushed his headquarters more and more to the front so that, on the night of Oct. 13, 1806, he pitched his tent in the hollow square of an infantry regiment in immediate contact with the enemy, the regiment of course esteeming itself highly honored by the selection. Napoleon then personally supervised the construction of a road for his artillery, and next morning reconnoitred the field and selected a standpoint from which he could observe the course of the battle.

The conduct of Napoleon in this campaign shows us when it is and when it is not necessary for a general to reconnoitre in person, "When the information brought in lies within the domain of strategy, it is not his business to reconnoitre in person; it is sufficient for him to rely upon the eyes of others;" but when he is within the province of tactics he must see and judge for himself. To quote from the Captain:

"It is true that the electric telegraph affords a means of transmitting intelligence rapidly, but the principle that when battle is imminent headquarters should be as near as possible to the battle-field remains as true as ever, for the way to the battle-field can only be covered on four legs, the endurance and speed of which are limited, even though the general is an unusually good rider and mounted upon an unusually good horse.

"But one cannot lay down rules which will always be correct. The choice of the general's position will depend upon the confronting circumstances; above all, upon his own views and those of the enemy. But in a case like that of August 17, 1870, where the troops had been in contact with the enemy in two previous battles, and when, on that day, a great part of the enemy's movements had been observed with the naked eye and might have been followed to their final objective and it nevertheless remained uncertain whether the enemy intended to remain in Metz wholly or only in part, circumstances demand that the general reconnoitre in person.

"On the 17th of August 1870, however, the reconnoitring was imperfectly done. The general headquarters far from pressing to the front remained some distance in rear, depending entirely upon the eyes of others. The advanced age of the King and Moltke may perhaps partially account for this. Moltke himself says that the information brought in up to midday of the 17th was very contradictory. 'The delay at headquarters at Flavigny till 2 o'clock P. M., August 18th, shows that up to the hour of 10.30 A. M. the French were supposed to be marching northward instead of pivoting on Metz. Only when the battle had begun did the general headquarters move up behind the I. Army.'

"During the battle of August 18th, the headquarters on both sides were badly posted. Again the headquarters of the Germans were so weighted down with notables, mere

figure-heads, that they were unwieldy, an error to be avoided in the future. Then too, complications were naturally caused by the presence of the Minister of War. As Moltke says, 'The Minister of War does not belong with the general headquarters but in Berlin.'

"The days being longer in August than in October the Germans should have been better informed August 17th than was Napoleon I. on the 13th of October 1806. The teaching that it no longer devolves upon a general to reconnoitre in person is false and must be combatted. Gravelotte and St. Privât were prepared positions and in all such cases the general must reconnoitre if he would have reliable information."

The author places this as a cardinal principle in the tactical school of to-day and continues: "At any rate the time was ripe for a reconnoissance upon all sides especially upon the right where the enemy was under one's very nose and where no commander reconnoitred or caused others to reconnoitre, and later on took no precautions for the establishing of communications between the staff and the troops engaged which under the circumstances was necessary and practicable.

"As this was not done, battle leadership on the part of the Germans was lacking, slippery charlatans, however, seek to legalize these neglects by the assertion that the general of to-day only brings strategy to bear upon the battle.

"If he did not he would be no general, but, when it comes to the test if he does not wish to lose the fruits of his strategy he must also be a tactician and for this again, he must choose a proper point of observation. * * *

"Bazaine's choice of position could only be justified by a complete tactical victory. But the knowledge he received two days later of a German reserve banished the hope of a recovery of his communications by a tactical success. Still Bazaine held fast to this hope as his movements show.

"The marshal also believed that the defensive would weaken the French less than the offensive would the Germans, though all things considered, the history of war showed the contrary.

"The twofold object of Bazaine (to let the enemy weaken himself by attack after attack and thus force him to leave the way free) depended upon these conditions for its success: I. An active general who knew how to make the most of the opportunities of the moment. II. Clever leadership in battle. III. A proper distribution of the troops and disposition of the reserve. IV. A favorable standpoint for the leader of the battle. V. The strengthening of the position by art to the greatest extent possible. All of these were lacking.

"Considered strategically it was a flank position in the fullest sense. The natural line of retreat was abandoned, every other (towards the Moselle) had been brought into relations unfavorable to the Marshal. The enemy could not pass this position by; he was forced to respect it and to make this strong opposing force as harmless as possible before continuing further operations.

"In the eyes of the Marshal, the strong fortress Metz was a sufficient reason for taking up a flank position; it afforded him a strong support for his flank so that he need not fear any serious danger on that side; it would also aid him in his efforts to weaken the enemy and regain freedom of action. It forced the Germans to leave important forces on the right bank of the Moselle (one army corps and three divisions of cavalry) and along Bazaine's entire front was ground which without special preparation would be difficult for the enemy, while the deep valley of the Mance uniting the great forests made a large wooded tract which, in case the enemy attacked, would lead him to the tactically strongest part of the whole line of battle.

"The position lacked in depth and in favorable and extensive communications, which in the case of the employment of the reserves or in case of a general retreat,

became necessary. Added to its insufficient depth and the faulty communications, the deep valley of Chatel running parallel to that of the Mance extended along its rear for three-fourths of its length, which hindered every movement and might become disastrous in case of a retreat. To be sure the forts of Metz (St. Quentin and Plappeville) lay so near to this valley that they would greatly lessen the evils of a French retreat provided the assailant did not follow close upon their heels.

"The choice of a flank position is only justified when the general has fallen under the power of the enemy, lost the initiative and intends to again assume the offensive. He does not take it up with a view to a stubborn defense alone, but to gain time, and by the employment of proper means and favoring circumstances to regain freedom of choice and action. To accomplish this requires an efficient army. It further requires a great, courageous and sharpsighted general, as well as a carefully prepared system of orders and disposition of the troops."

Bazaine should have razed the buildings at St. Hubert and have cleared the strip of woods running up the Mance valley. For this he had ample time.

On the German side General Steinmetz had only one army corps, the VII., remaining under his orders, and it appears that he did not relish the reduction of his command. He "was one of those generals who look upon the corps under their command as a sort of personal property, and whenever one is withdrawn for a shorter or longer time feel aggrieved and act accordingly. Clausewitz said that there should be no intermediate commander between the General-in-chief and the corps, and he was right in the case of generals like Steinmetz.

"From the south of Gravelotte * * * this general had seen the enemy's position at Point du Jour and Moscow, had noticed much life and movement there, and had concluded from the hasty intrenchments that the enemy would neither advance nor retreat but was preparing to receive an attack."

Generally speaking, Steinmetz had posted the VII. Corps in isolated detachments along the Bois du Vaux and to the south of Jussy and Vaux, and unity of action became impossible; indeed the tactical situation was not the most favorable, and a serious and energetic attack on the part of the French might have been fatal to the divided and scarcely deployable corps.

From the Bois du Vaux there were three natural routes to the French flank; there was only a distance of 350 metres to be crossed with no flank fire to be feared and the minimum of frontal fire.

Steinmetz should have imitated Napoleon and made a road for his artillery, but this he failed to do. Throughout the fight he had frequent opportunities for taking the enemy in flank, but he failed to see them and finally sent his men in by way of Gravelotte, thus adding to the difficulties and confusion of that part of the field and relinquishing the advantages of his position on the enemy's flank. He had failed to comprehend the intent of Moltke's order directing him to seek connection with the VIII. Corps to the front.

Moltke had planned a simultaneous attack on front and flank, but his order was misunderstood and was not executed acccording to his intentions. The leaders did not seem to have any reasonable object and the troops suffered in unfavorable formations.

"All that occurred here (on the French left flank) in the effort to take the French position was a failure, a confused and wild pushing and pulling without a clear idea of that immediately before them or which could be read from the map."

The Germans neglected to throw up hasty intrenchments before St. Hubert and on its flanks, and the Captain says they might have done this and proves his assertion by calling attention to the fact that the Uhlan regiment No. 4, and the Hussar regiment

No. 9, held out under fire in those parts of the field for half an hour and over and what was possible to cavalry was possible to pioneers. He tells us that the Americans threw up miles of intrenchments with imperfect means under effective fire while the Germans had good means at hand but did not know how to use them, and adds that the 4000 men who fell about St. Hubert need not have fallen had the same number of trees been felled and the same number of spadefuls of earth been thrown up.

"Nowadays men will seek for cover, even the best soldier does. As cover was not provided they clung instinctively to the point they should have avoided, namely, St. Hubert, until it resembled a hive of bees while the north and south of St. Hubert were quite neglected.

"The 43 penned-up companies behind St. Hubert (this number was finally increased to 59) could not deliver an effective fire and it was not delivered for the reason that one company prevented the fire of another. * * *

"Had a firing position been proposed the line of battle would have been 2500 metres long for the defense of which half of the companies at St. Hubert would have been sufficient while the other half could have been kept in hand in case of need. If any one maintains that such a measure was impossible we can answer that if without special leadership St. Hubert could be taken and held, if artillery and cavalry could maintain themselves there for hours, this would not have demanded too much.

"From observations upon the spot I have the impression that by the proper use of intrenchments the French positions might have been forced with a loss of one man where ten fell without result. Thus must the tactician conclude.

"Why was it that 43 and more companies could maintain themselves so many hours in St. Hubert with but insignificant losses? From a view of the French main position one concludes that one battery would have made this position untenable for 43 companies in half an hour. Every shot would either have swept the German infantry into heaps or scattered them. Why then was this battery not there? Were the French blind? Perhaps; but the superiority of the German artillery was so great that the French artillery only fought at intervals with but little result. To bombard St. Hubert would have exposed them too much and for this reason the 43 companies were able to crowd together and hold the farm. Their losses were entirely from infantry fire while they themselves did not kill 50 Frenchmen.

"The truth is that the German artillery was the true defender of St. Hubert. To prove this assertion let us refer to Point de Jour and Moscow. When these farms were in flames they were abandoned by the French who sought shelter in the intrenchments to right and left. This shows that if the French artillery had played upon St. Hubert the crowded masses would have evacuated it.

"Artillery is now improved but still it is to be remembered that 132 Prussian guns working over a front of 2000 metres neither shook the enemy's infantry nor drove it out. From this one can realize something of what will confront an assailant under similar circumstances."

The incidents of the battle of Gravelotte are discussed with the author's usual eloquence. A motley mass of fugitives fled deep down into the Mance Valley, part of them were ill-formed by superior officers happening that way and again sent in but they made little progress toward the front, officers and non-commissioned officers being too few for control. Part of these fugitives hid themselves in the woods until after the action. There were three panics on the German side in the course of the day, the last occurring at nightfall when the excited throng failed to recognize their own national hymn.

Most of this confusion was due to the ill-advised measures of Steinmetz and Zas-

trow, who acted without any reasonable object. The final attack was by order of the king and contrary to Moltke's wishes.

Steinmetz seems to have outgrown his usefulness. Points on the French flank such as the stone quarry fairly invited attack; but Steinmetz failed to see it nor would he let the advice of subordinate officers supply his own deficiency. Throughout his command only one opinion was recognized and that was his own.

Troops that had of themselves secured some point of vantage were left without support. "By not supporting the 16th Division of Prussian Infantry, which had taken and held the stone quarry of Rozeruilles, Steinmetz and Zastrow in these few hours destroyed all the laurels of their lives. When the tactical moment was ripe they might have had 19 battalions in hand but instead they had nothing.

"Left to itself before the strongest part of the French line until half past three o'clock, the 15th Division stood like a wedge in advance of the rest of the line of battle and exposed to a constant frontal and flank fire. Broken up into an irregular line of groups it had no fresh supports behind it.

"Indeed, only the great tactical superiority of the German artillery saved the 15th Division from being hurled down the bluffs by the superior strength of the French infantry."

In the course of the work Captain Hoenig compares Generals Steinmetz and Goeben. The latter seems to have been an ideal leader. "Quiet and temperate in his manner * * * one scarcely heard a word in his locality. His glances fixed upon the enemy he stood like a statue of bronze. * * * A quiet word to this or that general, general staff officer or adjutant, a nod of the head on receiving reports, and without ado, all was done that a general should do with calmness, certainty and skill so that, in spite of the critical situation, those around him were filled with confidence which, like an electric current reached out to the musketeers in front. We know this is so though we cannot tell why: A general can create confidence, a fool can cause a panic."

Steinmetz's conduct was quite the contrary; his outer demeanor showed the conflict that raged within. His relations with his subordinates were unpleasant and strained. Far from imparting confidence he created distrust and confusion.

On the French side Marshal Canrobert comes in for censure. He is blamed more than Bazaine. The latter intended that Canrobert should hold a concentrated position at St. Privât but instead he extended his troops beyond the bridge of Jaumort. This error was doubly felt because Marshal Canrobert did nothing to strengthen his position but let things go as they were. "Just where intrenchments were most needed in the vicinity of St. Privât there was nothing of the kind.

"The excuse has been made that the VI. Corps lacked an engineer park but that cannot be accepted for artificial strengthening was practicable with the means at hand, and there was ample time. Therefore there was a tactical contradiction. On August 17th Canrobert had plenty of time to secure engineers; he neglected this just as he neglected to forward valuable information of what was passing in his front until it was too late."

Bazaine is blamed for so posting his reserves that it was impossible to bring them up in time. His point of observation was badly chosen and he neglected to prepare a free passage on the road to St. Privât and to provide a system of conveying intelligence.

Concerning the simultaneous attack of the two German armies Captain Hoenig says:

"A position can only be attacked simultaneously when it is accurately located and when the assailants are equally distant from the point of attack. If one of these conditions is lacking such an attack is impossible. In this case both were lacking and this

was known at headquarters. Assuredly a second Gravelotte after such imperfect reconnoitring will never again be won."

Those who profess no great admiration for the German system will doubtless be glad to know that it can produce such generals as Steinmetz and Zastrow and that even the steady German troops are not proof against panic.

As a matter of fact the field of Gravelotte cannot be considered a tactical victory for the Germans for the French only evacuated it in consequence of their defeat at St. Privât.

It would be hard to point to a modern battle where there was as much blundering and confusion as at Gravelotte and the overwhelming superiority of the German artillery alone saved them from a defeat on that side.

In conclusion I may say that the notion which finds expression in some text-books* that a great battle no longer affords opportunities for tactical combinations is utterly exploded in the work we have attempted to describe.

A. S. FROST,
1st Lieut., 25th Infantry.

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*Mayne's Fire Tactics.

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"Infantry Action and our New Drill Regulations." By 1st Lieut. Carl Reichman, 9th Infantry. *The United Service.* (Hamersly.) August.

"Interior Ballistics." By Colonel Pashkievitsch. Translated from the Russian by 1st Lieut. Tasker H. Bliss, 1st Artillery, A. D. C. *Artillery Circular B.*

"The Theoretical Instruction of Gunners." By Capt. James Chester, 3d Artillery.

"The Effect of Accelerating and Retarding Winds upon Projectiles." By 1st Lieut. G. N. Whistler, 5th Artillery. *Journal of the United States Artillery.* July.

"Officers and their Weapons." By Col. M. J. King-Harman. *Journal of the United Service Institution of India* June.

"Modern Aerial Navigation." By Capt. J. D. Fullerton, R. E.

"Instructions for the Swimming of Cavalry." Provisionally issued to the German Cavalry. *Journal of the Royal United Service Institution.* July.

"The Combined Action of Cavalry and Infantry." *The United Service Magazine.* London.) August.

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XUM

Prize Essay—1892.

I.—The following Resolution of Council is published for the information of all concerned:

Resolved, That a Prize of a Gold Medal of suitable value, together with a Certificate of Life Membership, be offered annually by THE MILITARY SERVICE INSTITUTION OF THE UNITED STATES for the best essay on a military topic of current interest; the subject to be selected by the Executive Council and the Prize awarded under the following conditions:

1. Competition to be open to all persons eligible to membership.*

2. Each competitor shall send three copies of his Essay in a sealed envelope to the Secretary *on or before October* 1, 1892. The Essay must be strictly anonymous, but the author shall adopt some *nom de plume* and sign the same to the Essay, followed by a figure corresponding with the number of pages of MS.; a sealed envelope bearing the *nom de plume* on the outside, and enclosing full name and address, should accompany the Essay. This envelope to be opened in the presence of the Council after the decision of the Board of Award has been received.

3. The prize shall be awarded upon the recommendation of a Board consisting of three suitable persons chosen by the Executive Council, who will be requested to designate *the Essay deemed worthy of the prize;* and also in their order of merit those deserving of honorable mention.

4. The successful Essay shall be published in the Journal of the Institution and the Essays deemed worthy of honorable mention, shall be read before the Institution, or published, at the discretion of the Council.

5. Essays must not exceed twenty thousand words, or fifty pages of the size and style of the JOURNAL (exclusive of tables).

II.—The Subject selected by the Council at a meeting held Nov. 27, 1891, for the Prize Essay of 1892, is

"*THE ARMY ORGANIZATION, BEST ADAPTED TO A REPUBLICAN FORM OF GOVERNMENT, WHICH WILL ENSURE AN EFFECTIVE FORCE.*"

III.—The gentlemen chosen by the Council to constitute the Board of Award for the year 1892, are:—

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WM. L. HASKIN,
Secretary.

GOVERNOR'S ISLAND,
November 28, 1891.

*"All officers of the Army and Professors at the Military Academy shall be entitled to membership, *without ballot*, upon payment of the entrance fee. Ex-officers of the Regular Army of good standing and honorable record shall be eligible to full membership of the Institution *by ballot* of the Executive Council.

"Officers of the United States Navy or Marine Corps shall be entitled to membership of the Institution *without ballot*, upon payment of the entrance fee, but shall not be entitled to vote, nor be eligible to office.

"All persons not mentioned in the preceding sections, of honorable record and good standing, shall be eligible to Associate Membership *by a confirmative vote* of two-thirds of the members of the Executive Council present at any meeting. Associate Members shall be entitled to all the benefits of the Institution, including a share in its public discussions, but no Associate Member shall be entitled to vote or be eligible to office."

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THE following named officers have volunteered, or have been designated to prepare Historical Sketches of their Corps or Regiments for publication in this JOURNAL.

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THE TWENTY-SECOND REGIMENT OF INFANTRY.

By CAPTAIN OSKALOOSA M. SMITH, C. S., U. S. Army.

(Late First Lieutenant 22d Infantry.)

THE 22d Regiment of Infantry was originally the Second Battalion of the 13th Infantry, (a regiment of three battalions of eight companies each) which was organized by direction of the President, May 4, 1861, and confirmed by Act of Congress of July 29, 1861. It became the 22d Infantry under the Act of Congress of July 28, 1866, which act reorganized the Army of the United States. It is not the intention in this short sketch to go into the history of the regiment prior to its reorganization in 1866, as its previous services will no doubt be shown in the history of the 13th Infantry, further than to say that official records show that during the War of the Rebellion it participated in the following battles, viz.: Chickasaw Bayou, Miss., December 29, 1862; Arkansas Post, Ark., January 11, 1863; Walnut Hills, Miss., May 19; Siege of Vicksburg, Miss., which culminated July 4; Collierville, Tenn., October 11; Missionary Ridge, Tenn., November 24 and 25, 1863. Many of the officers of the original 13th Infantry had varied and peculiar records, the most noted and distinguished of which were those of the first colonel, William T. Sherman, and one of the original captains, Philip H. Sheridan, each of whom in turn became General of and commanded the Army of the United States.

In looking over the names of the original officers of that regiment, we find only three remaining upon the active list; some have been retired from service, others are in civil life, and many have heard the last tattoo.

In the organization of the 22d Infantry the field officers were Brevet Major-General David S. Stanley, colonel; Brevet Colonel Elwell S. Otis, lieutenant-colonel; Brevet Colonel Alexander Chambers, major. The regiment was reorganized in May, 1869, by the consolidation with it of the 31st Infantry, under the Act of Congress approved March 3, 1869. The field officers remained the same except that Brevet Colonel Joseph N. G. Whistler was assigned as major, vice Chambers, who was transferred to the 10th Infantry.

The regiment no longer has in its midst the other field officers mentioned. Stanley is a brigadier-general, Otis is colonel of the 20th Infantry and Whistler, who became colonel of the 15th Infantry, is retired from active service. There were, as the years passed on, numerous changes among the field officers, but only one in the grade of colonel. General Stanley was succeeded by Colonel Peter T. Swaine, who was promoted from lieutenant-colonel 15th Infantry.

As the 31st Infantry, which originally was the 3d Battalion of the 13th

Infantry, was embodied in the 22d Infantry in the consolidation of 1869, one-half the officers and all of the enlisted men of the 31st joining the new 22d, a brief synopsis of the history of that regiment will appear in these pages. The consolidation of the companies of the two regiments to form "the new 22d Infantry" was effected by consolidating the companies of the 22d—A and I becoming A; B and K, B; C and F, C; D and E, D; G and H, H. 31st Infantry Companies B and E, E; F and H, F; C and G, G; D and I, I; A and K, K.

In April, 1866, the 2d Battalion, 13th Infantry, was concentrated at Fort Leavenworth, Kansas; on the 26th of that month it left for the upper Missouri River taking station as follows: Headquarters and Companies A and B at Fort Randall; C, E and H, Fort Sully; D, Fort Dakota; F, Fort James; G, Fort Thompson, all in Dakota Territory. Companies I and K were organized at Fort Ward, Bedloe's Island, N. Y., October 2, 1866, (this after the designation had been changed to 22d Infantry) and left the same day, via Fort Leavenworth, for Fort Randall, where they took station.

The 3d Battalion, 13th Infantry, was organized at Jefferson Barracks, Missouri, and left that post for the upper Missouri River April 21, 1866, taking station: Headquarters and Companies B, E, F, G and H at Fort Rice; A, Fort Sully; C, Fort Buford; D, Fort Berthold, all in Dakota Territory. Company C, at Fort Buford, which at that time was nothing more than a camp, had seventy enlisted men, and there were only two officers with it—Capt. W. G. Rankin and Lieut. H. H. Ketchum, who was detached from the 2d Battalion. Their orders were to build a post; the only tools they had to do it with were the company axes. The second night after arrival the camp was attacked by Indians, who were driven away, but at the expense of one soldier wounded. The next day the Indians attacked and attempted to drive off the herd of beef cattle, but were repulsed and two Indians killed. The Indian attacks upon the camp were of almost daily occurrence during the summer and fall. Parties of men cutting and rafting logs from the mouth of the Yellowstone were often attacked and driven to camp, where, being joined by other men of the company, the Indians were driven off, the fighting lasting from two to six hours, often with loss on both sides.

Three civilian wood choppers in government employ having been killed at the mouth of the Yellowstone, Lieut. Ketchum, with sixty men, repaired to the spot, drove off the Indians and recovered the bodies with slight loss to his detachment. These were trying times, for the Indians, having been heavily reinforced, boldly boasted that they intended to annihilate the soldiers. During that winter the post was besieged by Indians; the troops were virtually cut off from water (the Missouri River) and had to sink wells near the quarters. Several times during the winter rumors reached the States that the garrison had been massacred, for in that time only one or two mails had been received at and sent from the camp, so it was spring before the people in the East knew what the real condition of affairs had been. Captain Rankin's wife spent that winter in camp, bravely enduring the hardship and danger incident thereto. Company I was organized at Fort Wood, and K at Fort Columbus, N. Y., October 3, 1866 (this after the designation had been changed to 31st Infantry), leaving the same day for Fort Lea-

venworth, Kansas, where they remained until May, 1867, when they moved to Dakota. Shortly after that the regiment was stationed with Headquarters and Companies H and I at Fort Stevenson; Companies A, D and K at Fort Totten; Companies B, C, E, F and G, at Fort Buford. That regiment built the posts mentioned, and Buford and Stevenson, under great difficulties. The working detachments carried their arms with them and oftentimes the Indians pounced upon them, causing them to leave their work, fall into line and open fire upon the enemy. Building logs were obtained under great hardship several miles distant from the posts, large escorts were sent with the wagons, and many men while on that duty were killed and wounded in fights with the Sioux Indians. The troops lived in tents until late in the winter of 1867. There was deep snow before they moved into their quarters and they got in none too soon at Stevenson and Totten, as a severe snowstorm came upon them, lasting three or four days; the wind was fierce and the weather extremely cold. Officers and soldiers were kept in their quarters for several days. At Stevenson the fuel in some of the quarters gave out and the officers burned their furniture to keep from freezing. A wagon train loaded with lumber and canned goods en route from Fort Abercrombie to Totten was forced to stop on the Cheyenne River, and to keep from freezing and starving the men burned the lumber and ate a large quantity of the canned articles.

Mails were received in the winter once in ten days at some of the posts; once a month at the more distant ones. They were carried on sleds drawn by large dogs, usually three in tandem, half-breeds being employed for this service. In the summer they were carried by soldiers. It was a very dangerous service between Rice, Stevenson and Buford, and between Totten and Stevenson. Those sections were infested by hostile Indians who oftentimes attacked the mail parties and many men were killed in that service. In the beautiful spring of 1868, after a hard winter, a party of soldiers left Totten with the mail for Stevenson, in high spirits, anticipating an enjoyable trip and a meeting with friends at the distant post. About midway between the two posts the party was attacked by a large number of Sioux Indians and every man killed. A rescuing party found their bodies stripped of clothing and mutilated. On June 10th, the same year, Capt. Albert M. Powell, a brave and accomplished officer of the regiment who rendered good service during the war as chief of artillery of the 17th Army Corps, was killed by being thrown from a vicious horse.

In the meantime the 22d was building Forts Sully and Rice; repairing and adding new buildings to Fort Randall under difficulties similar to those above recited. Detachments also occupied Indian Agencies where they had to build shelter. All of those posts were from time to time attacked by Indians. In the summer of 1868 a large number of Sioux Indians attacked the guard with the cattle herd at Fort Buford. The guard, including two or three officers who joined it on horseback, fought desperately, but were overpowered, Lieutenant Cusick having been wounded and several men killed or wounded, and the cattle stampeded and driven off. This was so sudden and the work so quickly done that the infantry could not get on the ground in time to take part in it. Lieutenant Hogan followed the Indians with men in wagons

(there were only enough horses at the post for a small detachment) and had some skirmishing with them, but could not recapture the cattle.

At that time there was not one mile of railway in Dakota or Montana and not more than two or three stage lines in the two territories; most of the military travelling was done with Government transportation. The railway had not reached Sioux City, Iowa; St. Cloud, Minn., 75 miles distant from St. Paul, was the western terminus of the railroad from that place. At this date everybody knows that there are several thousand miles of railway in Montana and the two Dakotas, and all military posts in those States are within reasonable distance of it. As an instance of how difficult it was to go from one post to another in those times when travelling without military escort, in 1870 three officers of the 22d Infantry being ordered from Fort Sully to Totten,—a distance, as the crow flies, of about 250 miles,—had to go via Sioux City, Chicago and St. Paul, travelling 1633 miles—3266 miles in the round trip. With the railroad facilities of the present day, the distance as usually travelled is about 450 miles.

In the summer of 1870 the 17th Infantry, under command of General T. J. Crittenden, went up the Missouri River, and part of the regiment took station at Rice, relieving the companies of the 22d at that post. The headquarters and several companies of the 17th were stationed for some time at Sully, and we thus had two regimental headquarters, including bands, at the post, which made it one of the gayest and liveliest posts in the United States. Finally that regiment took station at posts along the river above Sully, and the 22d occupied Sully, under command of the colonel, with Companies A, E, F and H; and Randall, under command of the lieutenant-colonel, with Companies B, C, D and G. Company I was sent to Crow Creek Indian Agency and K to Lower Brulé Agency, which are situated above eight miles apart and about midway between Sully and Randall, Crow Creek on the left and Brulé on the right bank of the Missouri. There those companies constructed with soldier labor substantial one-company posts. At the end of nine months affairs were so quiet at Crow Creek that Company I was withdrawn to Sully, and the military buildings were transferred to the Indian Department for school purposes and to this day are used in that way.

In the fall of 1871 the first expedition to the Yellowstone River, as escort to Gen. T. J. Rosser's surveying party of the projected Northern Pacific Railway, was organized at and started from Fort Rice. The column was composed of Companies D and H, 17th; B, 20th; and A, C, H and I, 22d Infantry; two Gatling guns and twenty-six Indian scouts, all under command of Bvt. Col. J. N. G. Whistler. The transportation consisted of 104 wagons. The expedition marched from Rice, September 9; reached the Yellowstone, at the mouth of Glendive Creek near where the town of Glendive is now situated, October 2; from there returned to Rice, arriving on the 16th, having marched over 600 miles. Some days the marches were short, others as many as twenty miles were made, and from time to time, a day was spent in camp resting. The companies returned to their posts from Rice by steamer, resuming garrison duty and the ordinary detached service until July, 1872, when a larger expedition to the Yellowstone, under command of Bvt. Maj.-

Gen. D. S. Stanley, was organized at Fort Rice. General Rosser continued in charge of the engineers. The Headquarters and Companies D, F and G, 22d; A, B, C, F, H and K, 8th; A and F, 17th Infantry, and a detachment of Indian scouts took part in the expedition, which marched from Rice, July 26, arriving at the mouth of Powder River, August 18. On the afternoon of that day General Stanley accompanied by several officers was having a parley with a party of Indians headed by Gaul, who stood upon the opposite bank of the river, when suddenly the Indians treacherously opened fire upon the group; strange to say not an officer was hit. A detachment of troops rallied to the spot and the Indians beat a retreat. Thence the command marched back to Cabin Creek, encountering the Indians in skirmishes; O'Fallon's Creek, August 21 and 22, and arrived at Rice, October 15, except Captain Miner's company, which was detained a few days longer with some of the engineers and then marched to that post. During the summer the troops had marched over 1000 miles. Among the casualties were 1st Lieut. Eben Crosby, 17th Infantry, killed by Indians, October 5, and 1st Lieut. Lewis D. Adair, 22d Infantry, who served gallantly during the war as an officer of Ohio volunteers, died the same day of wounds received at the hands of the Indians. General Stanley's colored servant, Steve, a faithful man, was killed about the same time.

In May, 1873, the third expedition to the Yellowstone was organized at Fort Rice and again commanded by General Stanley. The composition of it was: Troops A, B, C, E, F, G, H, K, L, M, 7th Cavalry; Companies C, 6th; B, C, F, H, 8th; A, D, E, F, H, I, 9th; A, B, H, 17th; Headquarters and B, E, H, I, K, 22d Infantry, and a detachment of Indian scouts. This expedition, accompanied by a large wagon train loaded with supplies, left Rice, June 20, arriving at the point of crossing of the Yellowstone, about fifteen miles above where the town of Glendive is now located, July 31, thence proceeded up the left bank of the river as far as Pompey's Pillar, but not without opposition from the Indians, who evidently had concluded that the surveying had gone far enough. On August 4th, just opposite to where Fort Keogh now stands, they attacked the advance guard, killing the veterinary surgeon, sutler and one soldier of the 7th Cavalry, which dashing regiment pursued the savages for several miles, killing a number of them. On August 11th, the Indians were again encountered by the cavalry opposite the mouth of the Big Horn River and a desperate fight ensued with loss of life on both sides. Lieut. Charles Braden, 7th Cavalry, was severely wounded. Lieut. H. H. Ketchum, adjutant 22d Infantry and adjutant-general of the expedition, who was temporarily with General Custer then commanding the 7th Cavalry, had his horse shot under him. Upon the approach of the infantry the Indians abandoned the field. That night the battalion of the 22d occupied the advance posts and exchanged shots with the Indians, who tried to approach the camp, probably to stampede the horses, mules and cattle herd. During the afternoon of that day the artillery detachment, which was composed of men of the 22d and commanded by Lieutenant Webster, was obliged to shell the timber along the bank of the Yellowstone to dislodge a large body of Indians, who were evidently preparing to impede the next day's march. They were dispersed and seen again only in small

parties, one of which fired into the camp at Pompey's Pillar and then beat a hasty retreat, having done no damage. From Pompey's Pillar the expedition marched to the Musselshell river, thence to the Great Porcupine, following it until the Yellowstone was again reached. This was a new and unexplored country and it was a very difficult thing to take a large command and wagon train through it. There was a great deal of hardship, especially from frequently having to drink alkaline water and sometimes having no water at all. The command marched into Fort Lincoln, arriving there September 22d, thence the companies proceeded to their respective stations. They had marched during the expedition over twelve hundred miles and returned in excellent physical condition.

The following year was a happy one to the regiment, as it was ordered to exchange stations with the 1st Infantry. This was accomplished in July, and stations were taken as follows: Headquarters and Companies D, F, and H, at Fort Wayne (Detroit), Michigan; A, Madison Barracks (Sackett's Harbor), N. Y.; B and K, Fort Porter (Buffalo), N. Y.; C and G, Fort Brady (Sault Ste. Marie); E, Fort Mackinac; I, Fort Gratiot, Mich. This was a new and happy experience for the regiment which had been so long on the northwestern frontier, but it was not to last long without interruption. On the evening of September 16 telegraphic orders came for Companies A, B, D, F, H, I and K to repair without delay to New Orleans to aid in maintaining the peace which had been broken by a complication of affairs, one of the principal elements being the organization known as the White League. The companies were packed and ready to start by midnight, and took the train early on the morning of the 17th, reaching New Orleans on the night of the 20th. It had been intimated that the duty would be of ten days' duration, instead of which it lasted eight months—until May, 1875—he battalion quartering from time to time in various parts of the city and at Greenville, one of its suburbs. Companies A and K were for a time at Jackson Barracks. Early in July, 1876, the news of the Custer massacre was flashed through the country, and the 22d Infantry was again placed under marching orders from the lake stations to go to the field. Never before or since were the troops at those stations sent on active service, but it appeared to be the fate of the 22d to remain in repose for short intervals only. On July 4 the companies at Fort Wayne participated in the parade at Detroit; on the 11th, except Company A which remained at Wayne, they left to join General Terry's command at the mouth of the Rosebud, Montana, being joined at Fort Lincoln by the other companies ordered out, the battalion then consisting of Companies E, F, G, H, I and K, Lieut.-Col. E. S. Otis in command. In a few days the steamboat *Carroll* was sent to take the battalion and a detachment of recruits for the 7th Cavalry to the Rosebud. On July 29, when the boat was passing the mouth of Powder River, the Indians in large number from the right bank of the Yellowstone made a vigorous attack upon it. The troops responded promptly and the boat was landed and two or three companies sent on shore. The fight lasted some time, engaged in by the troops on the boat as well as those on shore, until the Indians were driven back into the hills, with what loss we never knew. Their camp was taken possession of and burned, a few firearms and other trophies being found and taken on the boat. There were

two or three soldiers slightly wounded. On August 1 the battalion arrived at General Terry's camp, where it remained until the 7th. The next day it marched with General Terry's command up the Rosebud. The valley of the lower Rosebud is very rough and the marches were short and difficult. In the forenoon of the 10th there was great excitement, as a heavy dust was seen rising some two or three miles in our front and horsemen riding around. Reports went down the line that we were approaching the hostiles and an engagement was expected within a few minutes, when W. F. Cody (Buffalo Bill) with some Indian scouts came within recognizing distance, and informed us that General Crook's column was marching down the valley. That night the two columns camped together. The battalion was kept constantly on the march following Indian trails along the Rosebud, Tongue and Powder rivers and affluent streams, then crossed to the north side of the Yellowstone and marched to the rugged ridge which divides its waters from those of the Missouri. Seeing no signs of Indians it moved in the direction of Glendive Creek and camped opposite the mouth of that stream on the bank of the Yellowstone, August 31, where the campaign ended. The battalion of the 22d, and Companies C and G, 17th Infantry, having received orders to remain in Montana during the winter, commenced constructing huts for winter quarters, some of the companies being constantly on the road escorting supply trains to the cantonment at the mouth of the Tongue River, now Fort Keogh. In September Companies E and F were ordered to Custer Creek, and early in October they went to Tongue River for station.

On October 10th an escort to a wagon train, consisting of Companies C, 17th, and G. H and K, 22d Infantry, left Glendive for the cantonment on Tongue River; that night camp was made on Spring Creek, about fourteen miles distant. At three o'clock the next morning the camp was attacked, with a galling fire, by a large number of Indians, which attack was repulsed, but the mules became excited and many of them broke loose, over forty of them escaping from the corral, and falling into the hands of the Indians. The train was so crippled and the Indian force increased so in numbers by recruits, that the command was compelled to return to Glendive. Upon the return of the train, Col. E. S. Otis, the commanding officer at Glendive, reorganized it and on the 14th set out with it for Tongue River, with a command consisting of Companies C and G, 17th, and G, H and K, 22d Infantry. At 7 o'clock on the morning of the 15th, fifteen miles above Glendive, it was attacked by about one thousand Indians, and a desperate fight ensued lasting until 7 o'clock in the evening, during which time the train advanced several miles until, reaching a high plateau, it went into camp. The Indians practised every artifice to capture the train, among other things setting the prairie on fire, through which the troops and train had to pass. Considerable damage was inflicted upon the Indians, but the exact facts were never ascertained. Several men of the escort were wounded, but none killed. Private Donahoe, Company G, who was wounded July 29th, was again wounded in this fight. It was expected that the Indians would renew their attack in the morning, for we knew they were not far distant and by the first light could see them mounted in large numbers on our left flank. Shortly after the journey had been resumed a runner approached and left a

written communication upon a hill to the front, which was taken to Colonel Otis by a scout; it read as follows:

"YELLOWSTONE.

"I want to know what you are doing travelling on this road. You scare all the buffalo away. I want to hunt on the place. I want you to turn back from here. If you don't I'll fight you again. I want you to leave what you have got here, and turn back from here.

"I am your friend,

"SITTING BULL.

"I mean all the rations you have got and some powder. Wish you would write as soon as you can."

The above was written by a half breed well known to the 22d, who had cast his fortunes with Sitting Bull.

Colonel Otis sent word through one of his scouts that he intended to take the train through to Tongue River and would be pleased to accommodate them at any time with a fight. The Indians gathered again as if to commence battle, when presently a party bearing a flag of truce approached our lines and after a parley they concluded that they were tired of fighting and wished to arrange for a surrender. Colonel Otis very graphically describes this fight in his official report, which is published in the annual report of the General of the Army of 1876. In concluding it he says: "I cannot speak too highly of the conduct of both officers and men. The officers obeyed instructions with alacrity and executed their orders with great efficiency. They fought the enemy twelve hours and fired during that time upwards of seven thousand rounds of ammunition. They defeated a strong enemy who had defiantly placed himself across our trail with the deliberate purpose of capturing the train, and gave him a lesson he will heed and never forget."

Shortly after the return of the battalion to Glendive, Colonel Otis was ordered to duty at regimental headquarters, Brevet Col. A. L. Hough succeeding him in command. In the latter part of December, 1876, Companies E and F participated in General Miles' successful expedition against the hostile Indians who were with Sitting Bull and Crazy Horse in the Big Horn Mountains. They returned to Tongue River January 18, 1877, having greatly suffered in their camps and marches from the snow and very inclement weather. There were some casualties in those companies resulting from their fights with Indians, the most distressing being the severe wound of Private Bernard McCann, Company F, from which, after great agony, he died the next day.

In March, 1877, Companies G and H marched through deep snow to Tongue River, joining the garrison at that place for duty.

On April 30th, Companies E, F, G and H, together with two companies of the 5th Infantry, four troops of the 2d Cavalry and Lieutenant Casey's scouts, made up of men of the 5th and 22d Infantry and a few civilians, marched under command of General Miles from the cantonment, the object being to attack a renegade band of Indians, chiefly Minneconjous, under the leadership of Lame Deer, which was camped on the Rosebud, over 100 miles distant by the detour which it was necessary to make. At a point on

Tongue River, sixty miles from the cantonment, the train was corraled and left under guard of Companies E and H, 5th, and G, 22d Infantry; the scouts, Troops F, G, H and L, 2d Cavalry, and Companies E, F and H, 22d Infantry, with a few pack-mules to carry ammunition and rations, cut across the Rosebud, moving up that stream, and after a very hard march with scarcely a halt during two nights and one day, early on the morning of May 7th surprised and attacked the Indians near the mouth of Muddy Creek, now called Lame Deer, an affluent of the Rosebud, a beautiful valley where the Northern Cheyenne Agency is now located. Lieutenant Casey, with his detachment closely following him, was the first to dash through the slumbering camp, surround and take possession of the herd of 450 ponies. He was quickly followed by Lieutenant Jerome, who headed a troop of the 2d Cavalry, then followed the rest of the cavalry. The Indians opened fire, which was responded to by the troops. As soon as possible they were called upon to surrender. Lame Deer and Iron Star, his head warrior, appeared desirous of doing so, but the Indians again commenced firing upon the troops, which ended the peace-making; the fight was resumed and they were driven from the camp. Fourteen of them were killed, including Lame Deer and Iron Star, 450 ponies and the entire camp fell into the hands of the troops, among whom there were several killed and wounded.

The battalion of the 22d hearing the firing in front, quickened its march, arriving upon the scene shortly after the engagement and immediately took posts surrounding the camp. Firing between the troops and Indians was kept up the entire night, so there was very little sleep in camp. The next morning after burning the captured camp, the troops started back toward Tongue River, every infantry soldier being mounted on a captured pony, besides which there was a herd of them to be driven. That night the Indians made another attempt to recapture their ponies, but they were driven off by the rifles of the troops, and the ponies were successfully taken in to the cantonment, where they were used for several years in mounting the infantry.

Company E returned to the cantonment, but F, G and H made a scout, in company with the 2d Cavalry, toward the Little Big Horn, returning to the cantonment May 31st. Companies I and K left Glendive May 25th, reaching Tongue River by steamer on the 27th, and soon thereafter the battalion was again consolidated under command of Colonel Hough. About this time however it was understood that the Indian hostilities had ended and that the 22d would return to its eastern station. Colonel Hough was ordered to his post, Fort Mackinac, and the companies, under command of Col. H. M. Lazelle, 1st Infantry, together with a troop of 7th Cavalry and two companies of the 1st Infantry, left by boat June 16th, arriving at the mouth of Powder River the same day, thence a long scout was made toward the Black Hills country. The trail of Lame Deer's band was struck and followed in a northerly direction for several days, the troops getting so close upon the band at one time that the scouts under Lieutenant Casey were attacked by a large number of them, one Indian being killed. Their camp was located in the bad lands of the Little Missouri near Sentinel Buttes, to which place the expedition made an all night march but the Indians had taken the alarm and escaped. At that point Colonel Lazelle relieved the battalion,

and under command of Bvt. Major C. J. Dickey, it made a famous march to Fort Abraham Lincoln.

Upon arrival at Lincoln we were made glad by an order to proceed to our stations by steamer from Duluth, but before the symposium which was necessary under such good news was finished, the order was changed and the battalion was drected to repair forthwith to Chicago to aid in suppressing the railroad riots, where it arrived on the 25th and again fell under command of Colonel Hough. It remained there several days, until quiet was restored, being stationed in various parts of the city, and was then ordered to Wilkes-Barre, Pa., owing to the disturbed condition of the mining districts. The battalion then under command of Colonel Otis consisted of Companies A, B, C, half of D, E, F, G, H, I and K. They remained there until October when they were ordered to their proper stations. During the time from August, 1876, to July, 1877, the battalion that went to Montana marched upward of three thousand miles.

In 1879 the regiment was ordered to the Department of Texas and started for that department in April. While en route, on account of some Indian difficulties, Companies D, E, F and K, under command of Colonel Hough, were ordered to take station at Fort Gibson, Indian Territory, and the other companies would no doubt have been stopped also, but they were in advance and had already reached Texas. The colonel, lieutenant-colonel and Companies B, C, H and I were assigned to Fort McKavett, A to Fort Griffin. Fort McKavett was made sad and gloomy July 4th, by the death of Capt. T. H. Fisher, a very popular officer in the regiment. Early in the summer Company E went to Vinita, I. T., and K to Coffeeville, Kansas, where they remained until October, for the purpose of keeping boomers out of Oklohoma and to protect the inhabitants from the robbers who infested that part of the country.

In the fall of 1879 a general war with the Ute Indians in Colorado was anticipated and the companies at Gibson under command of Col. Hough were ordered to go there. They went to Alamosa, Colorado, by rail, thence they marched over the mountains to Animos, where, together with two troops of the 9th Cavalry and four companies of the 15th Infantry, they went into a camp of observation under command of Col. G. P. Buell to prevent the Southern Utes from joining the Northern Utes at Ouray. In January, 1880, the companies of the 22d were ordered back to Gibson, and on account of deep snow in the mountains, they were compelled to march to Santa Fé, New Mexico, where they met with a grand ovation. From that place they went by rail to Gibson, having marched over five hundred miles. From Fort Gibson they went by rail to San Antonio, Texas, where Company E took station, Companies D and K marched one hundred and twenty-six miles to Fort Clark, where they took station, regimental headquarters and Company H having some time before been ordered to that post.

The regiment remained in Texas, serving at several different posts, and doing much scouting, until November, 1882, when it was ordered to the Department of the Missouri; Headquarters and Company E at Santa Fé, N. M.; A, Fort Garland; B, G, H and K, Fort Lewis; C, D, F and I, Fort Lyon, all in Colorado.

The regiment campaigned and changed stations a good deal in the Department of the Missouri until May, 1888, when it was removed to the Department of Dakota, Headquarters and Companies A, B, C, D, F, H and K taking station at Fort Keogh, Montana, E and G at Fort Totten and I at Fort Abraham Lincoln, Dakota.

The companies were not in the "coffee cooling business," but were from time to time scouting or camping at agencies where the Indians were restless or were thought to be preparing to go upon the war path. In the latter part of 1890 there was an uprising of the Indians at Pine Ridge and Rosebud Agencies, South Dakota. Companies A, B, D, G and H were ordered into the field and campaigned more or less all of that winter, sometimes in very inclement weather. Company D, under command of Lieut. J. G. Ballance, made an extraordinary march to the relief of Captain Fountain's troop, 8th Cavalry, reported to have been surrounded by 500 Indians at Cane Hills, South Dakota. On December 23d, at 7.45 P. M., it started upon its march in a wind and snow-storm, from Beisigl's ranch, reaching New England City, a distance of 63 miles, at 1 o'clock A. M., the 25th, 29¼ hours; it was necessary to make a halt there to rest and thaw out the half frozen men. In a few hours the march was continued 22 miles, when a portion of Captain Fountain's troop was met, which reported the safety of the troop, and the company then returned to the New England City. In the meantime Companies C and K had hard tours of duty at the Cheyenne Agency, Montana.

In December, 1890, Lieut. E. W. Casey, who commanded a company of Cheyenne scouts which he had organized by authority of the War Department under plans originated by himself, marched from Keogh to the theatre of hostilities, and on January 7, 1891, was camped on White River, near the mouth of White Clay Creek, not far distant from the Pine Ridge Agency—and the hostile camp. Early that morning several of the Sioux had entered his camp and held a friendly talk with him. At 9 o'clock he started out with two of his scouts to examine the hostile camp and when within a short distance of it was brutally murdered by a Brulé Sioux (Plenty Horses) belonging to that camp, who, in a cowardly manner, shot him from the rear. Casey was a brave and energetic officer and an enthusiastic friend of the Indian. He originated the plan of organizing them into military companies, believing that by it much would be done to elevate and civilize them and looked forward to the realization of his efforts. He died before he had reached the meridian of his strength, full of intellectual vigor and generous impulses, and as most of us might wish to die—in harness. It was some time after the close of hostilities before the companies returned to their stations—July, 1891, found them all back at their posts.

Pursuant to G. O. 76, Headquarters of the Army, July 21, 1890, Companies I and K ceased to exist. The officers were assigned to companies, replacing absent officers, the enlisted men were transferred to other companies and the company records were laid away in the archives of the adjutant's office. Company I has since been resuscitated and is now being recruited as an Indian company.

During its varied service the 22d has come in contact with nearly every

regiment in the Army and its relations with other troops have uniformly been pleasant. It has always been a regiment of great *esprit de corps* and the officers are proud to have the number of the regiment upon their commissions. Under the Act of Congress approved October 1, 1890, no more commissions for the regiment will be issued, an officer will be in the 22d Infantry by assignment only and may be transferred to another regiment at any time.

The entire regiment is now stationed at Fort Keogh, Montana,—the first time it has ever been united at a post.

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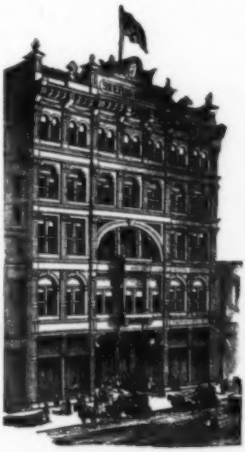

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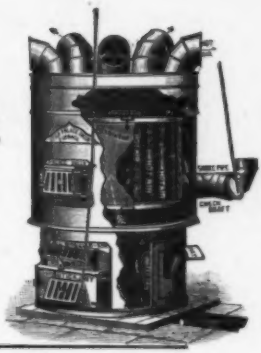

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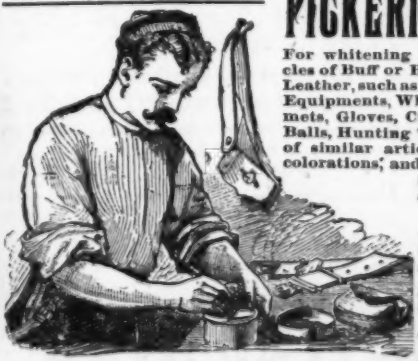

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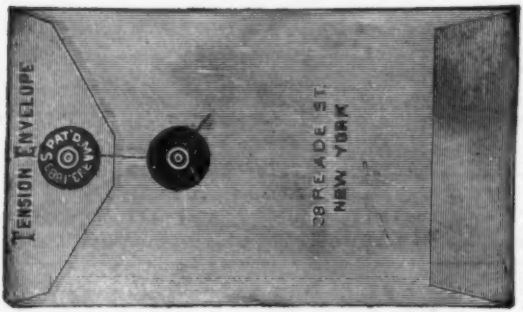

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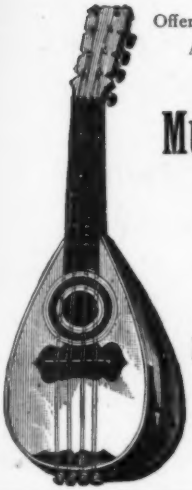

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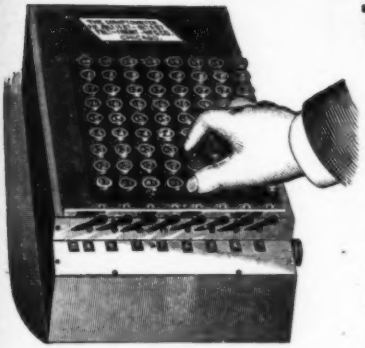

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